October, 1949

THE FOUNDRY

wherever metals are cast...

Clifford B. Cornell

Thanks A Million!

• A MESSAGE TO THE MANY FOUNDRIES WHO HAVE USED FAMOUS CORNELL CUPOLA FLUX—FOR YEARS.

Through your many repeat orders, you have given us a most important endorsement of our product. We appreciate this, and let us assure you that we will spend all our effort to serve you still better in the days to come.

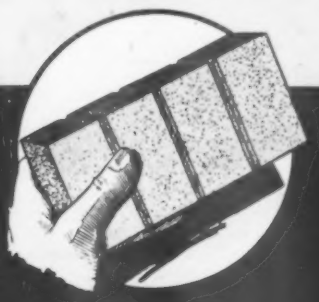
• A PROMISE TO NEW USERS

We are happy to list you among the many users of Famous Cornell Cupola Flux. It is gratifying that you, too, have taken the step that pays off through sulphur reduction, improved molten metal structure, reduced casting rejects and cupola maintenance.

Clifford B. Cornell
SECY.-TREAS.

Famous CORNELL CUPOLA FLUX

IN SCORED BRICK FORM



FAMOUS CORNELL FLUXES
Trade Mark Registered

The CLEVELAND FLUX *Company*

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

MORE AND MORE leading foundries are using Purite—the most economical desulphurizer you can get. The reasons for this growing acceptance of Purite are as practical and pleasing as good iron and sound castings! Check these points for yourself:—

1. **PURITE comes in 2-lb. briquettes—no weighing or measuring required.**
2. **PURITE is 100% fused soda ash—you do not pay for inert materials.**
3. **PURITE does not crumble—no waste—no dust.**
4. **PURITE can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without any deterioration.**
5. **PURITE gives 100% *fluxing action* in the cupola.**
6. **PURITE is the best and most economical refining and desulphurizing agent for ladle treatment.**

These are some of the indisputable benefits which explain why Purite is still the outstanding cupola flux and ladle desulphurizer available today. You'll want to know more about why Purite is so popular with so many leading foundries—so write today for full, factual information. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Mathieson
CHEMICALS
Purite is sold by all leading foundry supply houses in the United States and Canada.

PURITE 100% FUSED SODA ASH
THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

TECHNOLOGY DEPARTMENT

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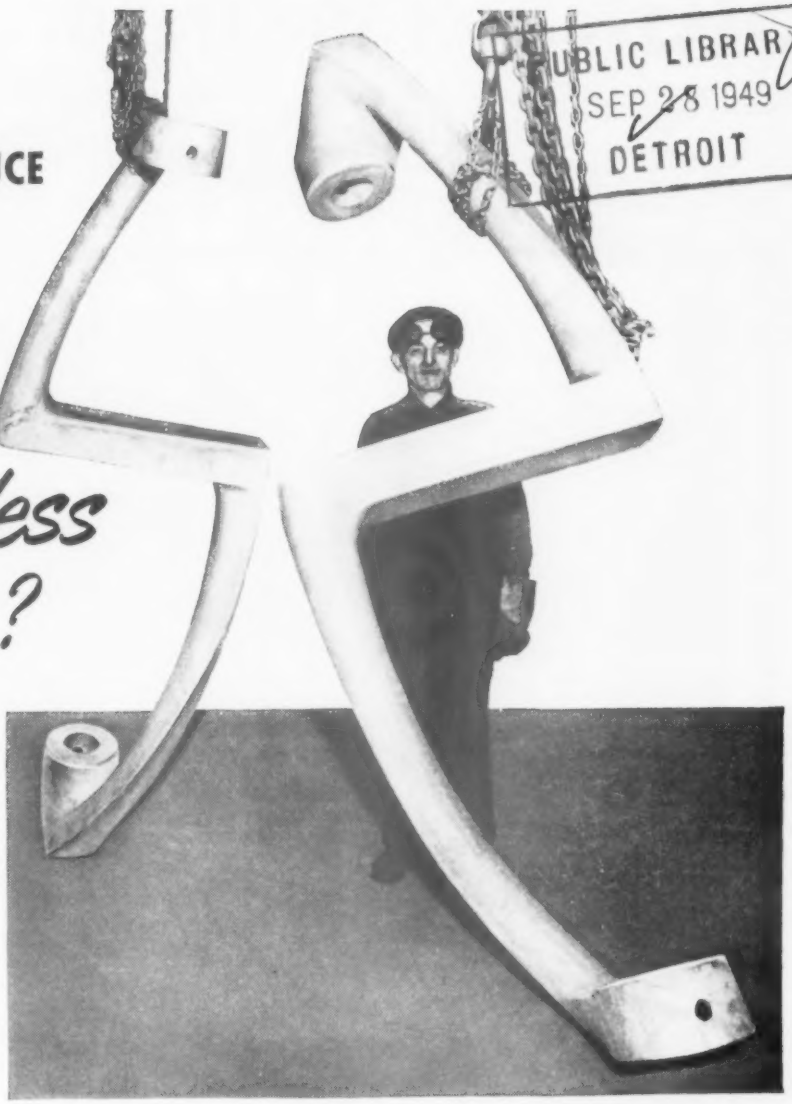
DETROIT

HOW WOULD *You* PRODUCE FULL-LENGTH HOLLOW CORES *in these Stainless Steel Castings?*



THE PROBLEM: These huge agitator blades for a leading manufacturer of plastics were specified in Cooper Alloy 17S, an austenitic chromium-nickel stainless steel corresponding in alloy content to Alloy Casting Institute's CF 8 designation.

Each casting, measuring seven and one-half feet in length, and weighing one thousand, five hundred and fifty pounds, was designed with a one and one-half inch hollow core running the full length . . . to provide a passage for water or steam with which to heat or cool the blade while in service.

Experience indicated that because of the unusual shape of the blades sand cores would be unsatisfactory and very unlikely to withstand the pressures and metal temperatures during casting.

HOW COOPER ALLOY FOUNDRY SOLVED IT: In place of a sand core, this foundry selected stainless steel tubing of the same composition as the cast alloy. Realizing that heat generated by the poured molten alloy would melt and deform the tubing, Cooper engineers developed a procedure whereby water was continuously forced through this stainless tube while the casting was being poured. Thus, the temperature was held below the melting point of the tube, and a satisfactory cored hole was assured.

Our casting specialists are always glad to help suggest suitable compositions of stainless alloys containing nickel for specific applications. Send us details of your problems for our suggestions.

Don't Forget...

INCO BOOTH NO. 302

Jot down—"INCO Booth, No. 302"—in your memo book of companies to visit at the **NATIONAL METAL EXPOSITION,** at the Public Auditorium in Cleveland, Ohio, October 17th to 21st. Convenient facilities for discussing your problems with our metallurgists and foundry specialists will be available.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

SIGNS of the trend...

Here's an 18-second summary on why most foundries use Crown Hill Seacoal Facing for venting molds.

The high volatile content (see Bureau of Mines figures) of Crown Hill means quick flash. Since the fusion point of the small ash residue is 2980° F., molten iron cannot fuse it, and low sulphur content eliminates hard spots. In short, peeling is easy and cleaning costs *come down*. Try Crown Hill, choice of most foundrymen.

FIGURES FROM BUREAU OF MINES
DEPT. OF INTERIOR OF THE U. S.

(Moisture Free)

PROXIMATE ANALYSIS

Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
	100.0%

Fusion Point of Ash . . . 2980°F

THE FEDERAL FOUNDRY SUPPLY COMPANY

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA.
Mines
CHATTANOOGA, TENN. • NEW YORK • ST. LOUIS • UPTON, WYO.

4600 East 71st Street
Cleveland 5, Ohio

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Commerce Station Box 71, Minneapolis 15, Minn.

OCTOBER, 1949

THE FOUNDRY

VOLUME 77—NUMBER 10

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Main Office

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How LINOIL at CARONDELET FOUNDRY CO.

St. Louis, Missouri

Assembling dry sand sections into a mold for a deep well pump casting. The cope is laid first, with the drag going on last. The mold is then inverted, backed with green sand, and poured "two-up". Entire assembly weighs 238 pounds . . . casting weighs 135 pounds.

helps make better pump castings

IN SAND MIXING...LINOIL is used at a sand-oil ratio of 60-1, by volume. That's approximately 1 pint of LINOIL to every 100 pounds of Michigan City sand . . . and cores are plenty tough. At these high ratios, cores are easy to bake, gas free, and are at minimum cost.

IN CORE BAKING...LINOIL-bonded cope and drag sections, 4 inches thick, bake out thoroughly in 2½ hours at 450°. A quicker bake means more cores per hour of oven operation . . . lower baking costs.

IN CASTING...LINOIL helps maintain a low scrap loss. Tough cores rule out cutting or washing by hot metal . . . well-baked cores prevent scabbing or blowing. Not only is scrap reduced, but cleaning-room costs are held to a minimum.

You can make better cores and better castings —at lower cost— by using...

LINOIL

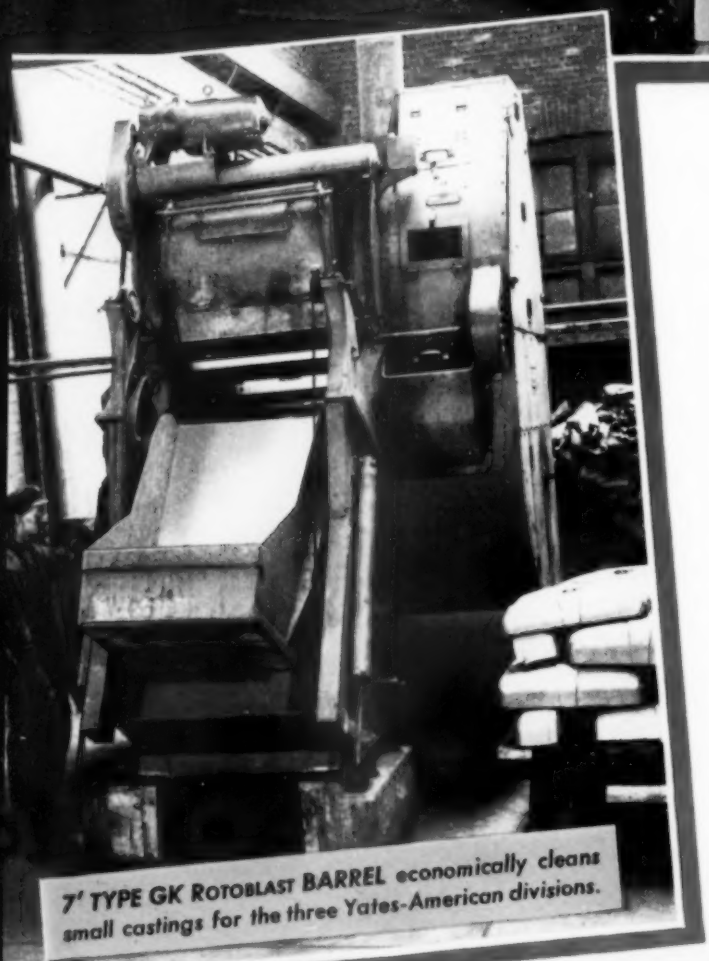
THE LINOIL — THE LOGICAL OIL

THE WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET · CLEVELAND 2, OHIO

TYPE LH ROTOBLAST TABLE swiftly cleans large castings for products made by all divisions of Yates-American.



7' TYPE GK ROTOBLAST BARREL economically cleans small castings for the three Yates-American divisions.

PANGBORN ROTOBLAST:

CLEANS FASTER because it throws more abrasive over a larger area with greater density.

CLEANS BETTER because it produces a finer surface than old-fashioned methods.

CLEANS CHEAPER because it requires less horsepower, uses less man power, needs less maintenance, eliminates need for air compressor!

IN addition to their ROTOBLAST team of Table and Barrel, Yates-American uses equally efficient Pangborn Dust Control. Now maintenance costs are lower and worker efficiency has been increased because dust concentrations which hamper production have been eliminated!

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

Pangborn

* Trademark of Pangborn Corporation

Pangborn ROTOBLAST*

SAVES $5,080

a year for YATES-AMERICAN MACHINE CO.

IMPORTANT NEWS IF YOU CLEAN LARGE OR SMALL CASTINGS . . .

YATES SAVINGS CHART

	Old Method	ROTOBLAST
Small Castings	3 hours	10 minutes
Large Castings	45 minutes	12 minutes
Labor		2 men released for other work

REMARKS:
Foreman says: "Economical! This machine is even more economical on abrasive than Pangborn told us!"

WANT TO CUT CLEANING COSTS? Here's how Yates-American Machine Co. saves money in their cleaning room:

Their new Pangborn ROTOBLAST team of Barrel and Table cleans small castings *18 times faster* . . . large castings *3.7 times faster* than ever before! *Actual cash savings* add up to $5,080 a year on labor alone and two men are released for other work. Additional savings on machining result from *cleaner castings* . . . and down-time is virtually eliminated! In addition, five old-fashioned tumbling mills with their dust and dirt have been removed by ROTOBLAST.

YOU CAN SAVE MONEY in your cleaning room with ROTOBLAST . . . the truly *effective* way to cut cleaning costs! Send coupon for your free copy of Bulletin 1200 for full facts. Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

CH-2 PANGBORN DUST COLLECTOR *keeps plant clean, stops dust which shortens life of machines, bearings, etc.*

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment.

MAIL COUPON NOW!

PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.
Please send me free copy of Bulletin 1200.

NAME .....

COMPANY .....

ADDRESS .....

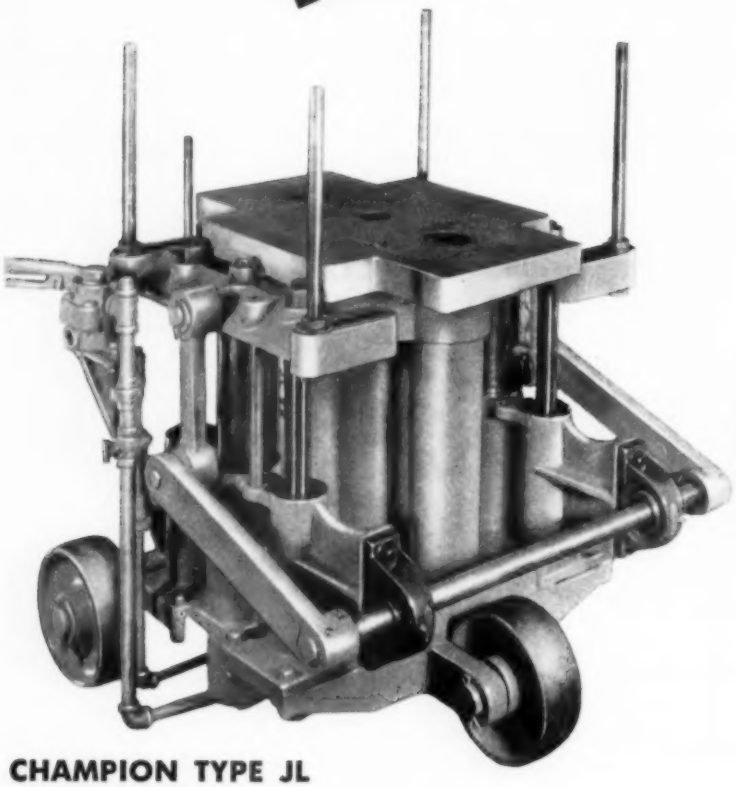
CITY ..... ZONE..... STATE.....

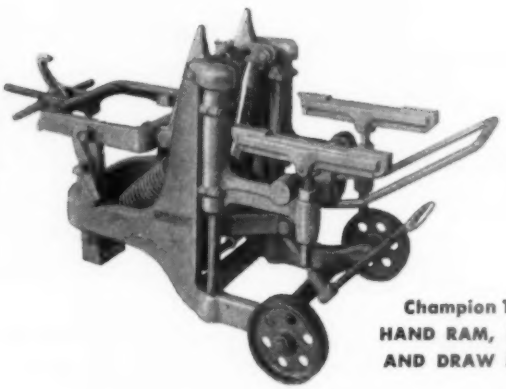
BLAST CLEANS CHEAPER

with the right equipment for every job

SPEED
ACCURACY
EASY OPERATION

The





Champion Type W.
HAND RAM, ROLLOVER
AND DRAW MACHINE

CHAMPION TYPE JL
JOLT PIN LIFT

Accommodates flasks up to 30" x 8" draw.

Designed for perfect ramming, accurate draw, low maintenance, long life.

All guides and bushings in jolt and pin lift are hardened and ground steel.

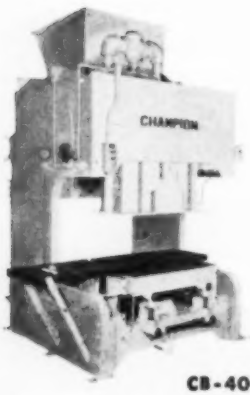
Equalizing mechanism is also fitted with hardened and ground pins and bushings.

Crank shaft operates in sealed dust proof ball bearings.

Champion Type JM
POWER JOLT, HAND
ROLLOVER AND
DRAW MACHINE

• • • •

CHAMPION CORE BLOWERS



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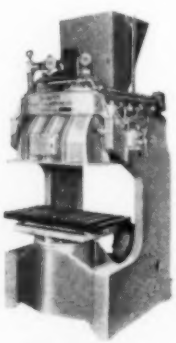

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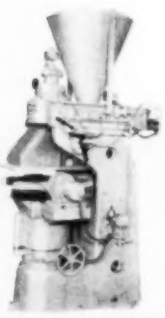

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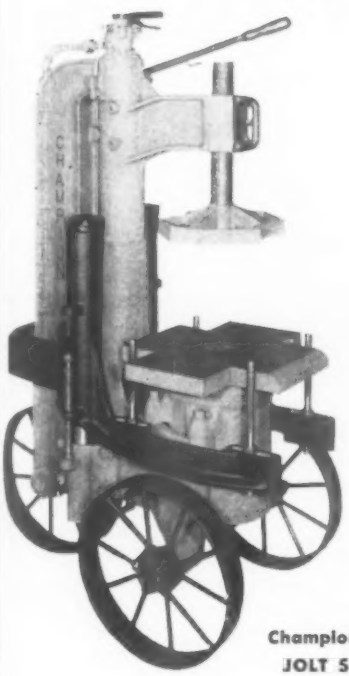
"Ear-marks" of a Champion!

Takes more than one good trait to win the blue ribbon —and Champion molding machines and core blowers have earned high favor through their balance of speed, consistent accuracy and easy operation.

High quality castings that require minimum machining and produce less scrap are least costly in the long run. Champion molding machines and core blowers give you a long lead toward this goal.



Champion Type JSL
JOLT SQUEEZE
PIN LIFT

Champion Type JS
PORTABLE
JOLT SQUEEZER

Champion Type JS
STATIONARY
JOLT SQUEEZER

Champion engineers and production specialists are glad at all times to give you the benefit of their long experience in helping you solve any mold or core making problems. Champion molding machines, jolt squeezers, rollover and draw machines have the high productive capacity, the precision and ease of operation that make the big difference in profitable production. There's a place in any up-to-date foundry for Champion equipment. Let us show you what these efficient machines can do for you.

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DELTA BONDITE*

FOR *SKIN DRY . . .*
DRY SAND . . .
GREEN SAND . . .
MOLDS AND CORES

THE SUPERIOR, WATERPROOF ORGANIC BINDER THAT . . .

Cuts Production Costs!

DELTA BONDITE, the new waterproof organic binder for skin dry, dry sand and green sand molds and cores is a decidedly superior product . . . immediately available in any quantities . . . and considerably more economical to use.

HERE'S WHY . . .

1. Removal of water by heat produces good tensile strength, very high compression and low hot strength.
2. To produce the above properties, no chemical reaction takes place thus resulting in stable sand surfaces on which the molten metal lays kindly.
3. The volatile gases produced by decomposition of BONDITE, ahead of the molten metal, are reducing in nature. This helps eliminate rough casting surfaces, burning-in and metal penetration.
4. Increased dry strength helps reduce buckling, scabbing, penetration and veining.
5. Prevents surface moisture absorption, becomes waterproof on drying.
6. Withstands high torch heat, will not cause edges of skin dry molds to crumble.
7. It is 98% volatile, leaves no excessive ash for sand contamination.
8. Clays, Bentonite, silica flour, fines or old sand have only a minor effect on its binding properties.
9. It is economical to use, reduces cleaning costs and greatly improves casting surfaces and soundness.

* Covered by U. S. Patents No. 2256832 for foundry use.

Ask for a working sample for test purposes and prove its superior qualities in your own foundry applications.

Complete data and specifications on the use of DELTA BONDITE will be mailed to you on request.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

BIG NEWS!

A new booklet gives you

"Facts you should know about

HARDFACING ALLOYS"

Send for your free copy, TODAY!

This NEW, FREE booklet by Airco gives you authentic, understandable information for combating wear — caused by abrasion, impact, heat and corrosion.

Here, you will get facts essential for increasing the service life of *new* parts, and restoring *worn* parts for additional service. In part, this definitive, profusely illustrated booklet gives you:

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If you are interested in increasing the service life of your equipment from 2 to 25 times, fill in and mail the coupon below for a copy of this NEW booklet. Send it to our nearest office or authorized dealer. On West Coast: Air Reduction Pacific Company. Represented Internationally by Airco Corporation (International).

ALSO — FOR ONLY $2.95 — YOU CAN GET A TRIAL ASSORTMENT OF AIRCO'S NEW LINE OF HARDFACING ALLOYS . . . A SPECIAL OFFER, AVAILABLE FOR A LIMITED TIME ONLY.

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☐ Send me a copy of Airco's New Hardfacing booklet — at NO cost to me.

☐ Here is my check for $2.95 — send me the special package of Airco's Hardfacing Alloys.

Firm_____

Signed By_____

Address_____

City & State_____

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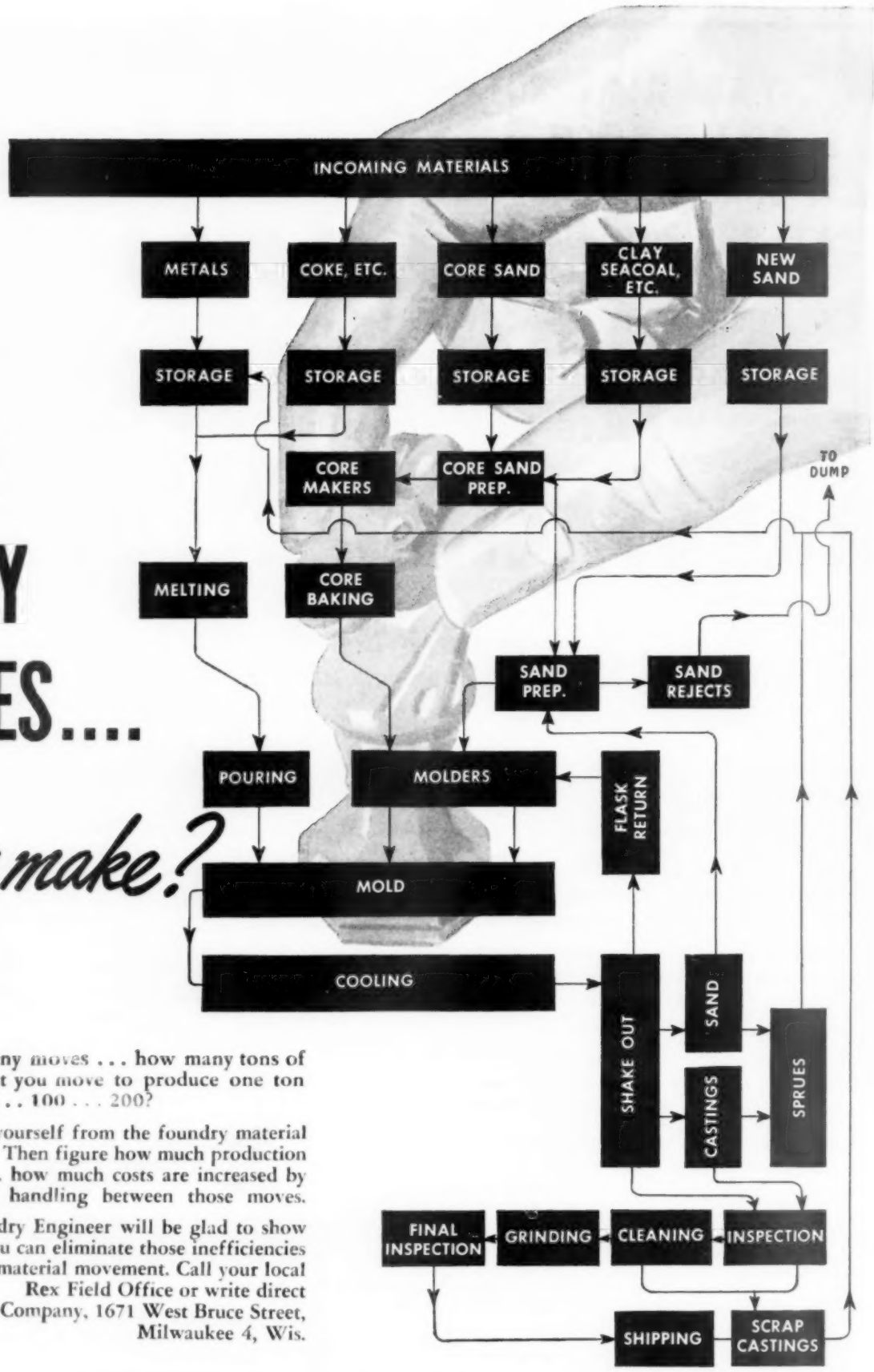
Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

HOW MANY MOVES.... *do you make?*



How many moves . . . how many tons of materials must you move to produce one ton of castings—50 . . . 100 . . . 200?

Figure it out yourself from the foundry material flow chart above. Then figure how much production is lost . . . how much costs are increased by inefficient handling between those moves.

A Rex Foundry Engineer will be glad to show you how you can eliminate those inefficiencies in your material movement. Call your local Rex Field Office or write direct to Chain Belt Company, 1671 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT COMPANY REX

FOUNDRY HANDLING SYSTEMS

Pouring it on — and no interruptions — straight line production. In this foundry they're doing things in a big way—are pleased with the result — PROFIT! For modern, mechanized foundry operations — single units or complete systems — call in a Jeffrey engineer.

THE JEFFREY MANUFACTURING COMPANY

907 North Fourth St., Columbus 16, Ohio

Baltimore 1, Birmingham 3, Boston 16, Buffalo 2, Chicago 1, Cincinnati 2, Cleveland 13, Denver 2, Detroit 13, Harlan, Houston 5, Huntington 19, Jacksonville, Milwaukee, New York 7, Philadelphia 3, Pittsburgh 22, St. Louis 3, Salt Lake City 1, Scranton 3

Complete Line of Material Handling, Processing and Mining Equipment

BETTER CASTINGS...DIRECT SAVINGS quickly pay for COLEMAN core and mold OVENS

● **REDUCE YOUR OPERATING COSTS** by replacing obsolete, inefficient core and mold ovens with Coleman Ovens. Why waste money using worn-out ovens? Install Coleman Ovens which quickly pay for themselves through immediate direct savings—savings which start in the core room and molding department and end up with perfect castings! It will pay you to investigate Coleman Ovens today because of these vitally important cost-saving advantages:

DEPENDABLE BAKING AND DRYING. All guesswork in core baking and mold drying removed. Rejects and make-overs eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost.

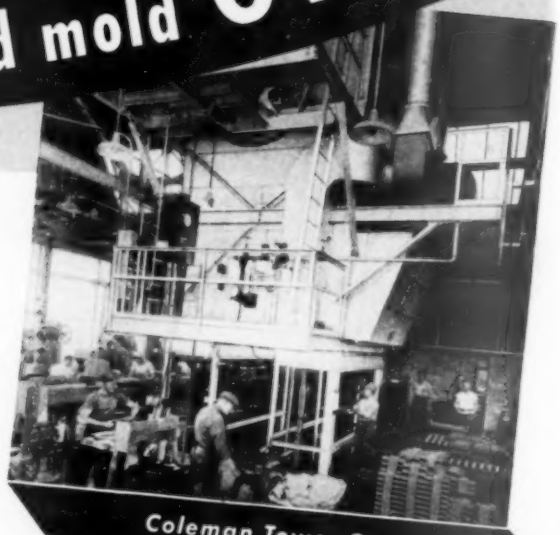
MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you—gas, oil, stoker-coal, electricity, etc.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases—helps to make the core department a better place to work.

COMPLETE RANGE OF TYPES AND SIZES to meet every need.

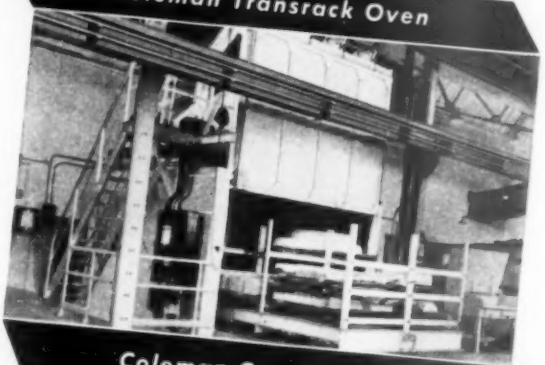
ADVANCED OVEN KNOW-HOW. Coleman Engineers have pioneered and developed the most efficient foundry oven designs. We will gladly study your operating conditions and recommend the type of Coleman Oven that will do your work at the lowest cost for fuel and labor.

Write today for Bulletin 48



Coleman Tower Oven

Coleman Transrack Oven



Coleman Car-Type Oven

Coleman Rolling Drawer Oven

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD CLEVELAND 13, OHIO

World's Oldest and Largest Foundry Oven Specialists

OVER 10,000 SUCCESSFUL INSTALLATIONS

Model CH-20 Truscon Power Handled Flask.

Model CH-40 Truscon Flask for Extra Heavy Duty.

HEADQUARTERS
FOR STEEL FOUNDRY FLASKS

THE SUCCESS of modern foundry methods depends upon the speed and economy with which molding operations can be handled.

Truscon's Pressed Steel Division—nationally known for the quality of its products and the dependability of its service—is fully equipped and prepared to handle your foundry flask requirements. The Pressed Steel Division's central location assures efficient service for your needs. Write for free catalog describing the complete line of Truscon Steel Foundry Flasks.

TRUSCON
STEEL COMPANY
PRESSED STEEL DIVISION
6100 TRUSCON AVE. • CLEVELAND 4, OHIO
Subsidiary of Republic Steel Corporation

Model OM-1 Truscon Flask for One-Man Handling.

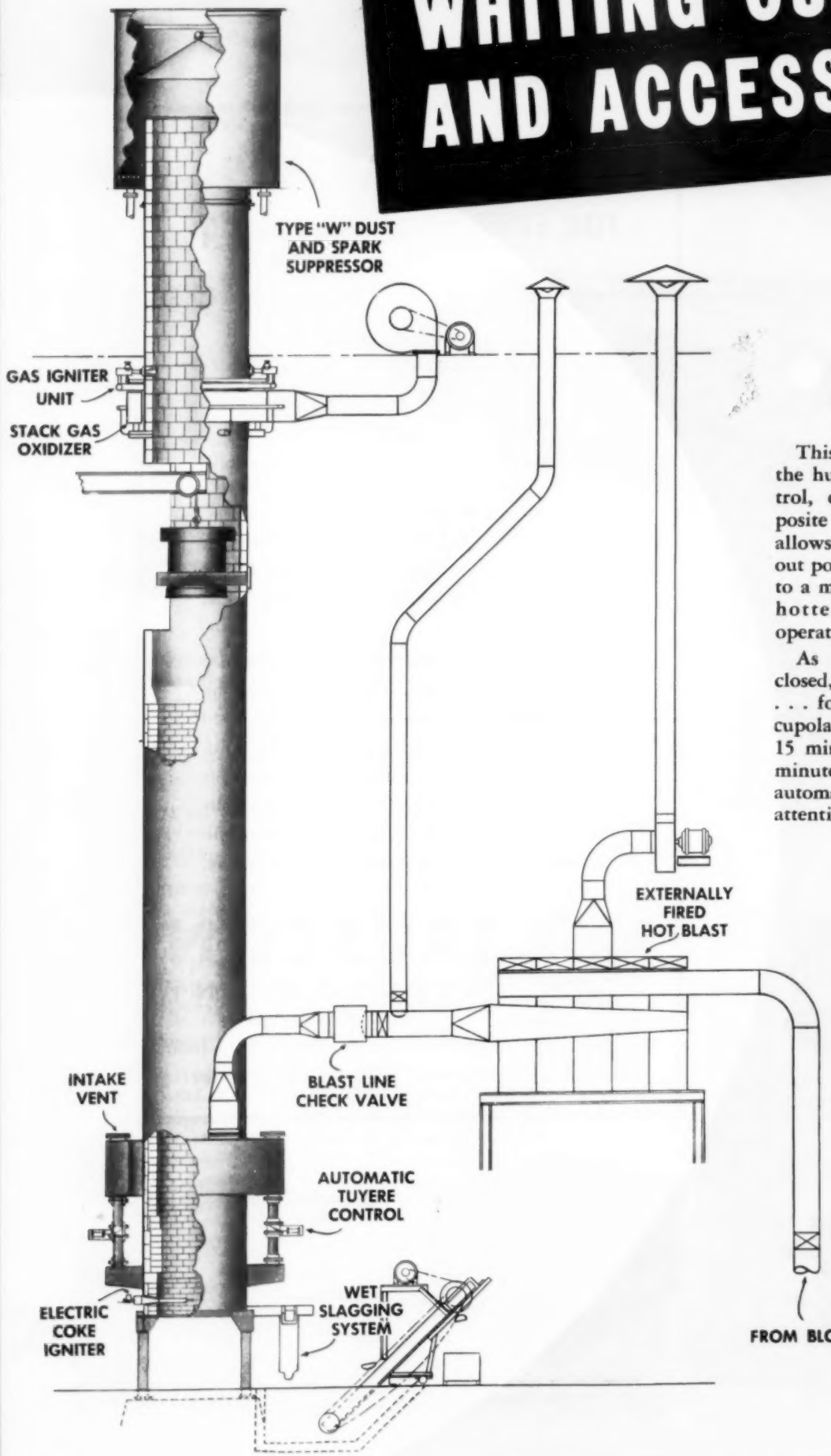
Model OM-4 Truscon Flask for One-Man Handling.

Model TMR-60 Round Truscon Steel Flask for Two-Man Handling.

Model TM-10 Truscon Flask for Two-Man Handling.

Model TM-12 Truscon Flask for Two-Man Handling.

WHITING CUPOLAS AND ACCESSORIES



AUTOMATIC TUYERE CONTROL

This arrangement eliminates the human factor in tuyere control, closing each pair of opposite tuyeres periodically. This allows the slag to melt out without poking and reduces bridging to a minimum. Faster melting—hotter iron—more uniform operation.

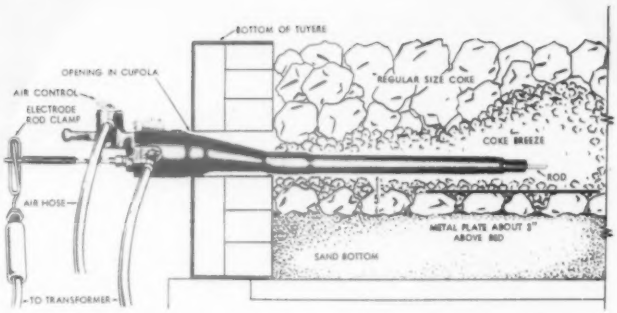
As each pair of tuyeres is closed, those next are reopened . . . for example, in a 10-tuyere cupola, each tuyere may be closed 15 minutes, then opened for 60 minutes, then closed again—automatically, without human attention.

MECHANICAL CHARGING:

As the pioneer in mechanical charging methods, Whiting today offers a wide variety of charging equipment from simple vertical skip chargers for small cupolas to complete systems, including mechanical make-up and yard cranes, engineered to fit the job.

for Better Melting Practice

The Whiting Cupola, America's No. 1 iron melting unit for over 60 years, is being constantly improved to meet changing needs and conditions. Illustrated are some of the newer accessories and special features now available to foundry operators to meet their particular requirements.



ELECTRIC COKE IGNITER facilitates lighting up the coke bed without use of kindling, and no smoke.

TYPE "W" HYDRO-CLONE DUST AND SPARK SUPPRESSOR

This unit provides a practical means of suppressing cupola smoke, fly ash, and sparks by means of effective wetting. It simplifies compliance with rigid city ordinances and keeps the cupola from being a neighborhood nuisance.

STACK GAS OXIDIZER is usually used in conjunction with Type "W" Hydro-Clone. It reduces density and color of smoke discharged from the cupola.

GAS FIRING UNIT is installed above the charging door, to ignite escaping stack gases when the cupola is being ignited.

HOT BLAST SYSTEMS

Illustrated is the Whiting-Ross hot blast system which supplies the cupola with preheated air, substantially reducing the coke charge and improving melting conditions. This unit employs either gas or oil as fuel.

Also available is the Whiting-Griffin Hot Blast System which utilizes gases from the cupola stack to preheat the blast. Both systems are in operation and giving highly satisfactory results.

SAFETY VALVES: All Whiting Cupolas are now furnished with Whiting-Norwalk wind box intake vent valves, which automatically prevent accumulation of explosive gases in the wind box.

An added safety feature which can be furnished is the Whiting-Norwalk check valve for preventing back flow of combustible gases to the blower.

WET SLAGGING SYSTEMS

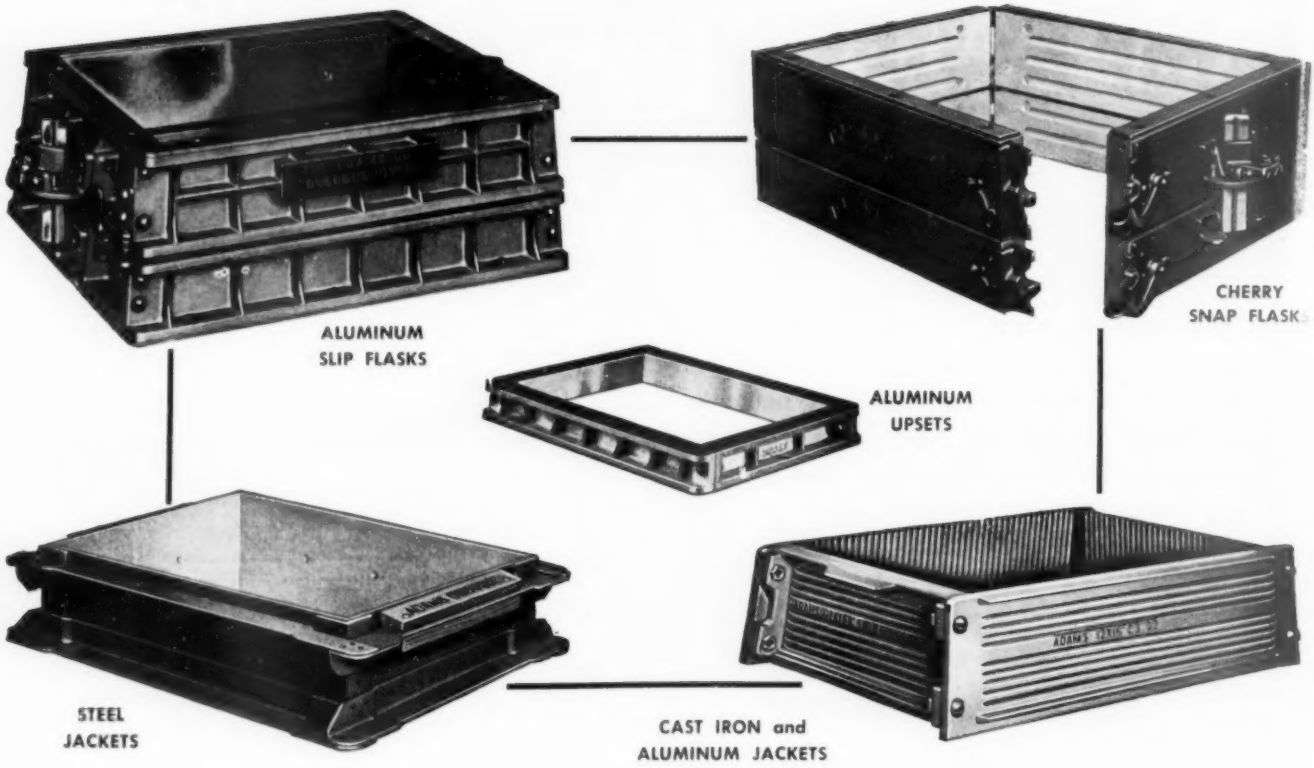
Whiting is prepared to supply wet slag disposal systems in which the slag is instantly quenched with water, and the resulting granular material automatically ejected by a conveyor. The same unit can also serve for disposal of sludge from the Hydro-Clone Dust and Spark Suppressor.

Information on any of the units mentioned on this page may be obtained on request. Address your inquiry to

WHITING CORPORATION

15607 Lathrop Ave. Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.



Precision Equipment for Precision Work

Cherry Snap Flasks
Cherry Slip Flasks
Aluminum Slip Flasks
Easy-Off Flasks
Cherry Presser Boards
Wood Bottom Boards
Steel Bottom Plates
Steel Jackets
Aluminum Jackets
Cast Iron Jackets
Steel Bands
Steel Upsets
Cherry Upsets
Aluminum Upsets

ADAMS CUSTOM-BUILT FLASKS

PRECISION performance under all foundry conditions . . . that's what you get when you use Adams flasks! They insure accurate, uniform molds throughout years of hard usage because they are precision built to your exact specifications . . . give you better, faster production because they fit the specific requirements of your individual job . . . keep costs low by reducing rejects, minimizing finishing requirements. Adams flasks retain maximum rigidity and accuracy through years of service. Superior design and construction eliminate excess weight and make handling easy.

In today's increasingly competitive market, it's the precision product, made at lower cost, that brings in the profit dollar. For full information on Adams complete line of flasks and flask equipment, write THE ADAMS COMPANY, 700 Foster Street, Dubuque, Iowa.

The ADAMS Company

ESTABLISHED 1883

DUBUQUE, IOWA, U.S.A.

MOLDING MACHINES and FLASK EQUIPMENT

AQUA-SET

A SYNTHETIC CORE BINDER

"A"

PAYS OUT 4 WAYS

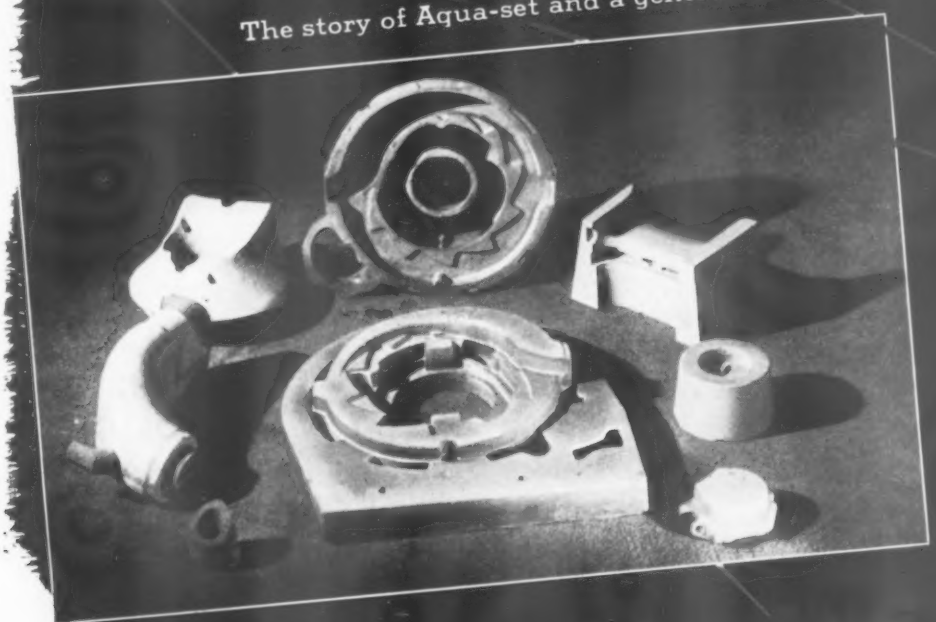
1st Aqua-set is not an oil type binder. Most of the oven time needed to oxidize a conventional core oil is saved in baking Aqua-set cores.

2nd Most of the fuel required to keep ovens up to high temperatures for long bakes is saved since Aqua-set cores are done when thoroughly dried of moisture with oven heat, and only temperatures of 300°F to 350°F are required.

3rd Most of the cleaning room costs can be saved since Aqua-set cores will turn to sand on pouring and will flow freely from castings.

4th Aqua-set pays out with a plus value in finer castings, and that means castings made from all types of metal.

The story of Aqua-set and a generous sample are yours for the asking.



U

1429 WALNUT STREET • ERIE, PA.

INCREASE FOUNDRY PRODUCTION with "dag" Colloidal Graphite

YOU get more efficient foundry operation . . . substantial production increases . . . you have better working conditions . . . when you spray or brush **"dag"** colloidal graphite dispersions on chills, patterns, and permanent molds. Rapid clean parting and smoother surfaces are assured because the exceedingly thin dry film of **"dag"** colloidal graphite resists oxidation, minimizes gas pockets, and permits easy removal of castings.

Foundrymen find that **"dag"** colloidal graphite dispersions do not affect casting . . . dimensions are held to close tolerances. Better mold production is secured, with longer mold life and easier parting; choking fumes and smoke are reduced to a minimum. Also, binding and stripping of push pins, shoulder screws and flask pins are eliminated by brushing or spraying with **"dag"** colloidal graphite dispersions.

An Acheson Colloids engineer will be glad to advise you on how to use **"dag"** colloidal graphite. The coupon will bring detailed information . . . without obligation, of course.

Branch offices in Boston, New York, Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, St. Louis, Los Angeles, San Francisco, Toronto.

Coating permanent mold at the Thomas Paulson & Son, Inc. foundry, Brooklyn, New York.

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

☐ Send me more information
☐ Send a sales engineer at my convenience

NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE_____

STATE_____ K-14

ACHESON COLLOIDS CORPORATION

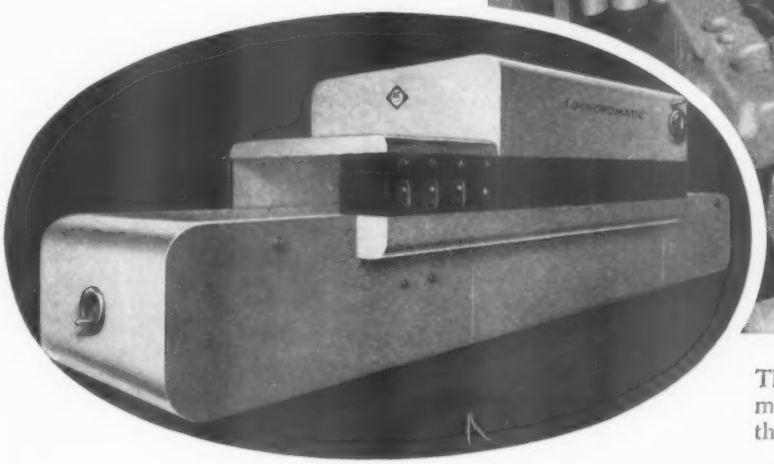
dag COLLOIDS

Port Huron, Michigan

80% LESS TIME TO DRY SAND CORES!

NEW DIELECTRIC CORE DRYER

- *Eliminates Excess Heat*
- *Cuts Space Requirements*
- *Reduces Casting Rejects*
- *Slashes Handling Time*



This 21-lb core dried in 12 minutes . . . only 30 minutes from core bench to molding. And 26 of these cores (546-lbs) can be dried in one hour.

NEW *FOUNDROMATIC* SAND CORE DRYER — BUILT BY ALLIS-CHALMERS SAVES TIME — IMPROVES CASTINGS

CORES MOVE directly from the core maker onto the conveyor belt of the *Foundromatic* dryer. When the cores come out of the dryer, they're hard, cool, ready-to-use. No additional curing or steam-out time is required. Cores may be handled with bare hands. All the unpleasantness of working with hot cores is eliminated. Electrode spacing is adjustable to handle cores ranging in height from 2 to 15 in.

Allis-Chalmers own huge foundries were the testing ground for the new unit. A-C foundry and electronic engineers co-operated in applying the time-tested principle of dielectric heating to special foundry requirements.

SEE NEW CORE DRYER OPERATE

Visit Allis-Chalmers foundries and see the new unit in operation. Arrange with your nearby A-C representative, or write direct Electronic Section, Milwaukee. See at first hand the savings possible in space, time and handling with the new core dryer.

Foundromatic is an Allis-Chalmers trademark.

SEND FOR DETAILS

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

Send me information on new *Foundromatic* Sand Core Dryer.

Name.....

Title.....

Company.....

Street.....

City.....State.....

A 2796

ALLIS-CHALMERS

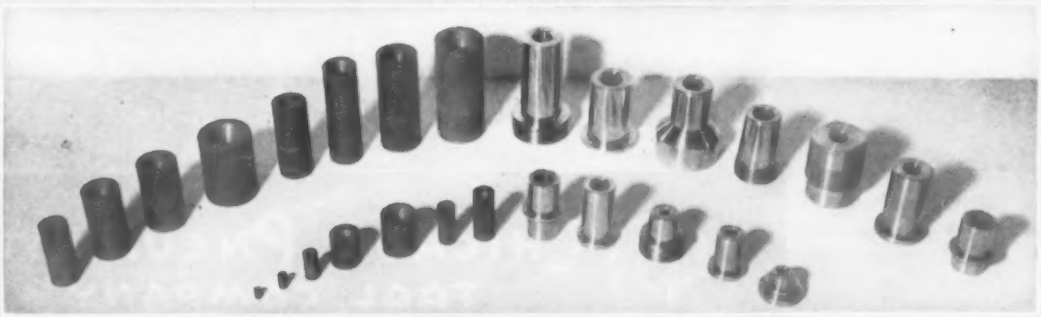
For Foundry Economy—NORBIDE® Nozzles
Iron nozzle stream at start
Same nozzle after 3 hours
Norbide nozzle after 404 hours

NORBIDE Nozzles for Pressure Blasting

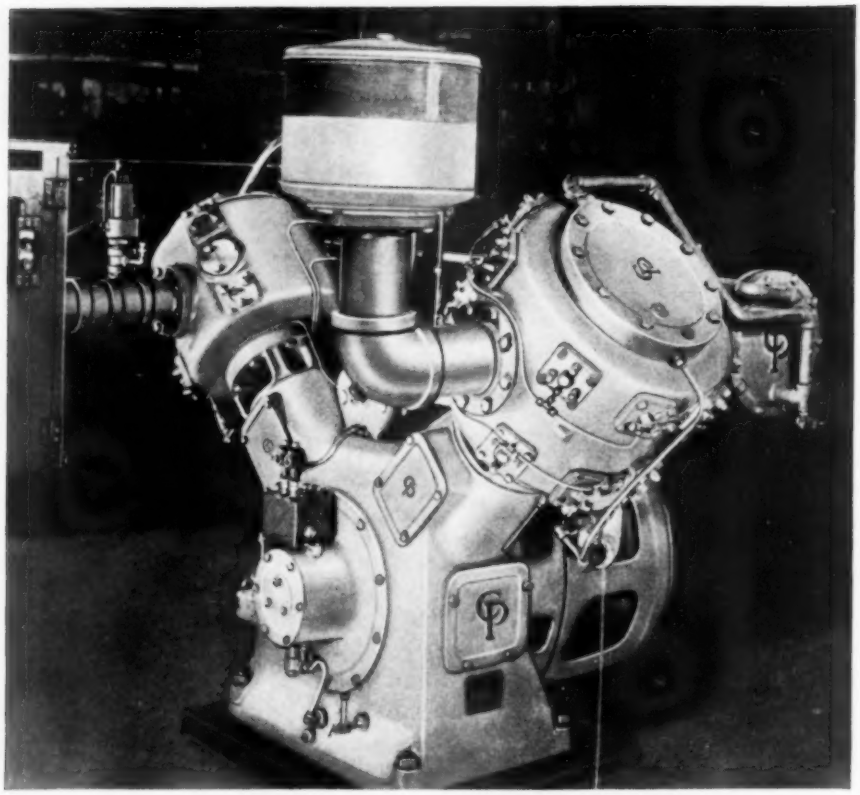
NORBIDE Nozzles are recommended for foundry use because they will outwear conventional types of nozzles thousands of times.

Made of Norton Boron Carbide — the hardest material manufactured for commercial use — NORBIDE Nozzles will last for weeks and months where ordinary nozzles wear out in hours. The result is that NORBIDE Nozzles give more service per dollar cost than any other nozzle (the guaranteed minimum service is 750 hours with silica sand), they decrease air consumption 10% to 20% as compared with iron nozzles, and they maintain a stream contour and abrasive velocity which improves blasting efficiency.

The great wear-resistance of NORBIDE Nozzles enables them to retain almost peak efficiency for a long time. The time lost by nozzle changes is saved. Production increases follow.



NORTON® NORTON COMPANY • Worcester 6, Mass.



here's the answer to restricted floor space —the Type Y Compressor

While its compact design makes it ideal for close quarter installation—it has plenty of other outstanding advantages.

It is shipped intact as a "package unit," ready for external connections.

It requires only a simple foundation and no special skill is needed to align and install it.

It operates at high efficiency because of such valuable features as large area Simplate valves, multi-step capacity regulation, effective inter-cooling, precision bearings and force-feed lubrication.

And finally it's extremely easy on maintenance.

Available with built-in or direct-coupled motor, or with V-belt drive, in capacities of 500 to 900 c.f.m., at 80 to 125 pounds pressure. Sizes for other pressures also furnished.

Write for full information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

TO HELP YOU PRODUCE

High-Quality Iron

FREE BOOKLET TELLS
HOW CUPOLA ADDITIONS OF ALLOYS
IMPROVE FOUNDRY PRACTICE

This new booklet describes in detail:

- How ferro-alloys control the composition of iron and compensate for variations in raw materials.
- The beneficial effects of silicon, manganese, and chromium in cast iron.
- Advantages in using ferro alloy briquets.
- How to calculate the number of briquets to add to the charge.
- How to control carbon, sulphur, and phosphorus.
- Typical cupola charges for soft gray iron, high-strength iron, and low-chromium iron.

24 pages, including tables showing standard cupola charges and iron composition. A real help to all foundrymen.

ELECTRO METALLURGICAL DIVISION
Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

OFFICES: Birmingham • Chicago • Cleveland • Detroit
New York • Pittsburgh • San Francisco

In Canada: Electro Metallurgical Company of Canada, Limited
Welland, Ontario

USE THIS CONVENIENT COUPON

Electro Metallurgical Division
Union Carbide and Carbon Corporation
30 East 42nd Street, Room 1813
New York 17, N. Y.

Please send me, without obligation, a copy of "Briquetted Alloys for the Iron Foundry Industry."

Name ..... Title .....

Company .....

Address .....

For faster baking time

use CYCOR*151 synthetic resin binder for sand cores and dry molds

Cycor 151 gives foundries 33% to 50% faster baking time than old-time binders—at baking temperatures of only 350°F. This means positive savings in production and BTUs.

The use of Cycor 151 improved synthetic resin binder for sand cores and dry molds also means many other advantages in the production of cleaner, more uniform castings. Good collapsibility. Elimination of expensive clean out.

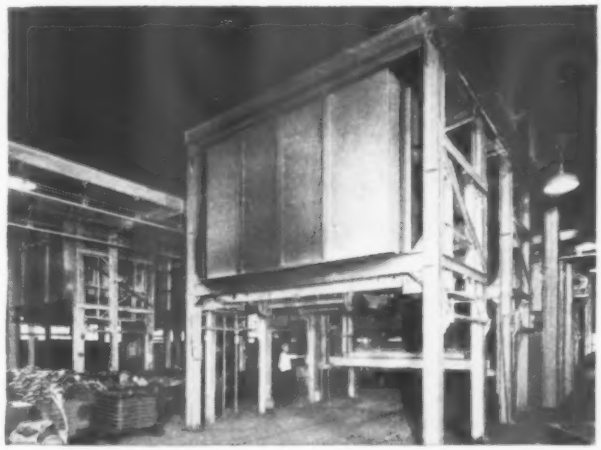
And don't forget this: with Cycor 151, you purchase *only* the neat synthetic resin; you can modify this resin with fillers or extenders to meet your particular requirements.

Get the particulars about Cycor 151 for use in your own foundry. Just write to Plastics Department, American Cyanamid Company, 38C Rockefeller Plaza, New York 20, N. Y.

*Reg. U. S. Pat. Off.

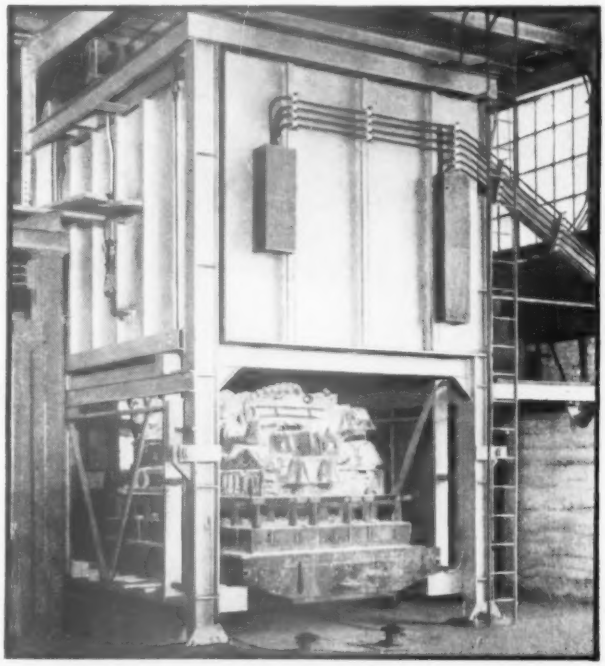
AMERICAN Cyanamid COMPANY
PLASTICS DEPARTMENT
38C ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Annealing malleable iron castings



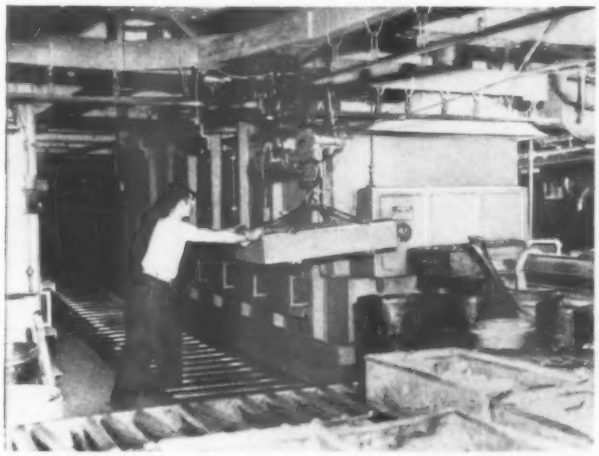
. . . four pairs of G-E electric furnaces anneal 32 tons per day in this midwestern foundry.

Annealing steel castings



. . . one G-E elevator furnace anneals 10 tons per charge in this southern foundry.

Annealing grey iron castings



. . . two pusher-type G-E furnaces anneal 30 tons per day in this eastern plant.

DO IT BETTER *Electrically*

Tell us about your annealing job, and we'll show you what General Electric furnaces can do for your particular operation. G-E furnaces and electronic induction heaters are also available in a variety of types and ratings for brazing, hardening, drawing, soldering, carburizing, and most other heat-treating processes. Ask your nearest G-E office to put you in touch with a G-E Industrial Heating Specialist. Or write direct to *Sect. 720-9, Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

ELECTRIC FURNACES

In addition to a shorter time cycle and increased output, they also give you:

- **Lower over-all cost**
- **More uniform, better quality anneal**
- **Materially reduced cleaning costs**
- **Minimized thermal losses**
- **Cleaner, cooler working conditions**
- **Dependable continuity of service with less maintenance**
- **Less floor space required**

GENERAL ELECTRIC

720-9

it's NEW

it's MORE COMFORTABLE

it's RUGGED

Heavy Duty Glove

AO 5X264

Feel it, test it, wear it and you'll see why this latest addition to the AO steel stapled line is ideal for handling small castings, rough stock, grinding and similar work.

Made of specially treated chrome tanned cowhide leather for long wear, the glove features a canvas back with elastic strap to overcome hand fatigue while providing a cooler feeling and snug fit.

All seams are steel sewed and the seam along the forefinger has been eliminated for longer glove life and added comfort at this vulnerable point.

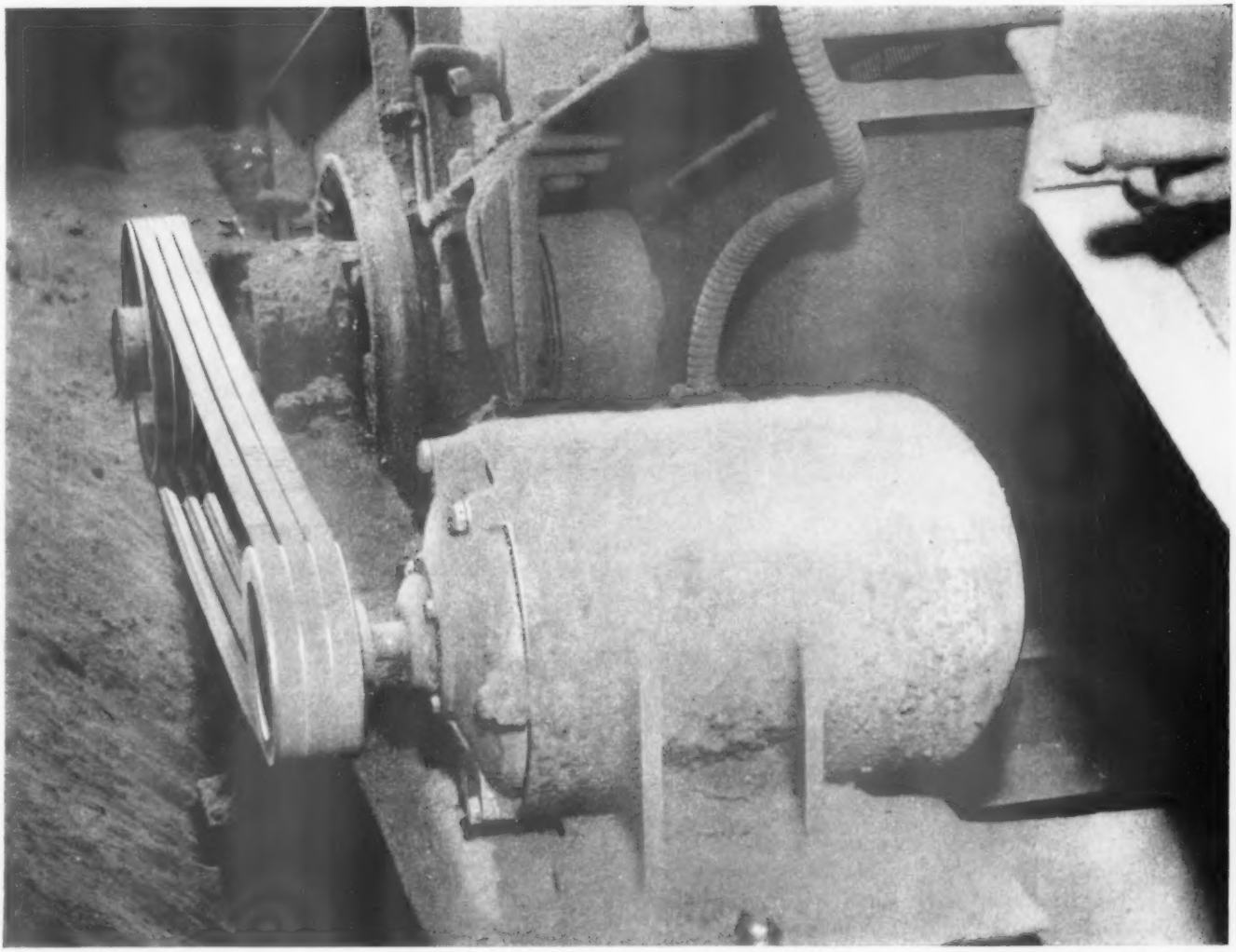
Wearing surface of the palm has also been increased by extending the palm — no bib patch — another comfort feature.

The steel stapled strap at the thumb crotch fortifies one of the weakest parts of a glove. There is a steel stapled patch on face of thumb and a short cufflex cuff with tape binding.

You'll lower your glove costs with the 5X264 — ask your AO Safety Representative or inquire at your nearest AO Branch Office.

American Optical COMPANY
Safety Division

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



Sandstorm Service Routine For A-C Totally-Enclosed Motor

HERE IS ONE of the toughest jobs assigned a motor in a foundry—driving an open screen in a sand conditioning system. Absolutely unprotected from storms of sand, this Allis-Chalmers totally-enclosed fan-cooled motor gives dependable service day and night in the Cicero, Illinois plant of National Malleable and Steel Castings Company.

Allis-Chalmers motors are standard in this well-known foundry because they are built to take the terrific punishment of foundry service. Double seal on shaft protects bearings and working parts against dust and dirt. Extra strong electrical parts stand up under stalling and adverse load conditions . . . continue to give dependable service.

Get the extra durability of Allis-Chalmers totally-enclosed motors for your foundry. Sold by expert application engineers through A-C Authorized Dealers and Sales Offices. Service guaranteed by A-C Certified Service Shops in all industrial areas.

Bulletin 6144 describes Allis-Chalmers totally-enclosed motors in detail. Write for your copy.

A-2746

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

Foundromatic and *Regulex* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

Foundry Equipment for Bigger Output-Better Working Conditions!

VIBRATING SCREENS | CUPOLA BLOWERS | FOUNDROMATIC SHAKEOUTS | FOUNDROMATIC CORE DRYER | INDUCTION HEATING & MELTING | REGULEX ARC FURNACE CONTROL

50% More CORE BAKING PRODUCTION

at

OLIVER CORPORATION FOUNDRY

Charles City, Iowa

with this

NEW HYDRAULIC CORE LIFT and TWO DESPATCH CONVEYORIZED OVENS

This novel method of core handling was introduced at the Oliver tractor foundry in conjunction with the installation of two modern conveyor type DESPATCH Core Baking Ovens. The hydraulic lift is used to transfer cores to and from the oven conveyor racks. It makes core handling a smooth, continuous and speedy operation which helps to lower operating costs, increase production and minimize working hazards for both employees and cores.

The two ovens, designed and built by DESPATCH are gas-oil fired and have high volume forced convection heating systems for extra fast heat transfer. Adjustable louvered port openings in the duct work keep air distribution and circulation in the oven work chambers at maximum uniformity for faster and better core baking. High velocity air seal curtains add to the baking efficiency of each oven. Insulated cooling chambers are equipped with special fans for removing fumes and for quickly cooling the cores.

The entire system was installed by DESPATCH to meet the company's specific needs. Operating results show 50% more core baking production; 25% lower maintenance cost and 100% improvement in core baking quality.

DESPATCH CAN HELP YOU! Let Despatch engineers help you to higher production records. Despatch assures you faster, better baking in ovens that are right for your particular needs.

WRITE TODAY for Bulletin J-31

Above are scenes in the Oliver Foundry where grey iron transmission cases, front frames and motor blocks for Oliver tractors are turned out. Daily capacities are 30 large cores and 80 medium size cores per hour. Ovens run 16 hours per day and daily tonnage of sand is forty.

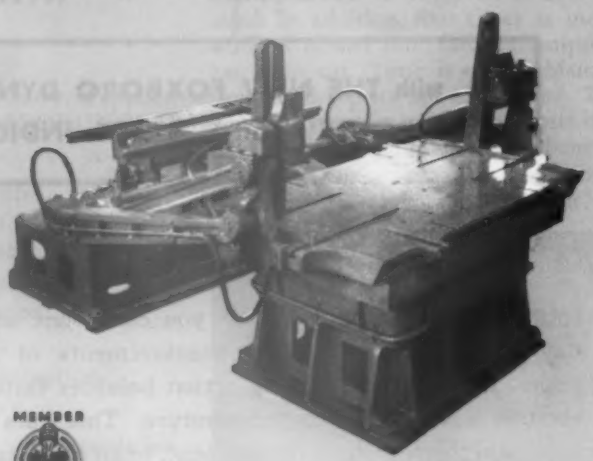
DESPATCH OVEN COMPANY

Minneapolis Office: 619 S. E. 8th Street

Chicago Office: 7070 N. Clark Street

SOUTHERN WHEEL DIVISION • AMERICAN BRAKE SHOE CO. • TOLEDO, OHIO

This Foundry Is A Good Place to Work



MEMBER

Completely mechanized throughout, this plant daily produces hundreds of railroad car wheels weighing 750 pounds each. The main foundry is approximately 300′ x 500′ in size with comparable storage capacity.

Overhead conveyors, sand handling equipment and other mechanical means of moving production through the plant make it a good place to work. Safety measures of all available types are widely used. Good housekeeping is practiced throughout the plant.

This foundry is equipped with Herman jar roll-over machines of their 3000 pound capacity series. Jar stripping machines are also used. Wheel molds are turned out at the rate of about one per minute.

Herman's hydraulic roll-over pattern draw permits smooth operation. One rotary valve handle controls the complete cycle. Pressure lubrication is provided to each moving part; automatic air lock leveling device equalizes irregularities in flask and bottom board.

Only Herman molding machines have patented roll-over action that provides a complete 180° roll-over with power applied on only 90° of the roll!

Herman molding machines are used in this foundry and four other Southern Wheel Division foundries, because they've made their way by the way they're made. May we hear from *you?*

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

NOW...

precise pouring temperatures almost instantaneously!

. . . with THE NEW FOXBORO DYNALOG ELECTRONIC TEMPERATURE INDICATOR

HERE'S AN INSTRUMENT that you can count on day after day for *exact* temperature measurements of non-ferrous pours. Its unique measuring action balances faster than the thermocouple comes to temperature. This cuts immersion time, and thermocouple replacement, to an absolute minimum.

The first industrial instruments that take full advantage of electronic circuits, Dynalog Instruments have fewer moving parts . . . fewer parts to wear or get out of order. Their unique variable air capacitor provides friction-free, completely stepless balancing, unlimited by slidewire turns, unhampered by slidewire troubles. They require practically no maintenance. No knowledge of electronics required. For speed, accuracy, sensitivity and simplicity combined, they have no equal.

Consider the advantages of the Dynalog Concentric Indicator as a means of getting better castings and greater foundry output. Examine the instrument from every angle . . . performance records . . . convenience . . . service-life. Write for complete information now. *The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U. S. A.*

HIGH VISIBILITY — large, open-face, easy-to-read concentric scale.

HIGH SENSITIVITY — the result of STEPLESS continuous balancing, unlimited by the turns of a slidewire.

HIGH BALANCING SPEED — only 5 seconds for full scale pointer travel.

HIGH ACCURACY — Calibration accuracy ¼ of 1% of scale for all normal ranges . . . a direct result of the unique capacitor circuit.

FOXBORO
REG. U. S. PAT. OFF.

RECORDING · CONTROLLING · INDICATING INSTRUMENTS

Bulletin on SUPER REFRACTORIES

by CARBORUNDUM
TRADE MARK

NO. 5 OCTOBER, 1949

EXTRA ADVANTAGES REALIZED WITH SUPER REFRACTORIES

Super refractories are often applied to meet a definite objective. While accomplishing this primary purpose, other benefits are also realized that may well provide economies or production advantages of even greater value than the original objective. For example, in a particular installation, a certain super refractory or combination of super refractories may be selected to secure greater production. While this goal is achieved, reduced maintenance through longer life of the refractories, lower fuel consumption and other secondary benefits can easily add up to savings that assume greater importance than the primary objective.

Generally speaking, the advantages realized from properly selected and applied super refractories by CARBORUNDUM may be grouped as:

Longer service life.
Fewer outages for repair and replacement.
Increased production.
Better quality ware.
Fewer rejects.
Lower fuel consumption.
Less maintenance.

Results, such as these, are possible because of the unique characteristics of these products. In the chart shown here, these characteristics are tabulated.

Physical Properties of Super Refractories by CARBORUNDUM
TRADE MARK

	CARBOFRAX	MULLFRAX	MULLFRAX S	ALFRAX K	ALFRAX B	ALFRAX BI
Heat Conductivity at 2200°F. in BTU/hr. sq. ft. and °F./in. of thickness	109 BTU	16 BTU	9 BTU	24 BTU	12 BTU	7 BTU
REFRACTORINESS PCE CONE	37-40	38-39	37-38	37-39	39-40	38-39
SPALLING RESISTANCE	High	High	High	Good	Good	Good
ABRASION RESISTANCE	High	Medium	Medium	High	Medium	Low
THERMAL EXPANSION (25°—1400° C.)	.0000044	.0000059	.0000069	.0000074	.0000086	.0000086
MODULUS OF RUPTURE @ 2460° F. PSI	800-3125	100-250	175-475	100-1050	100-225	50-100
WEIGHT 9 IN. STRAIGHT	9.25 lbs.	9 lbs.	8 lbs.	10.1 lbs.	7.25 lbs.	4.8 lbs.

Switched to CARBOFRAX hearth for longer service... realized important production cost cuts

A CARBOFRAX silicon carbide hearth was installed at this metal working plant. At work temperatures ranging from 1200° to 1850° F. and under loads as high as 600 lbs. per pan, other hearth materials proved unsatisfactory.

With the switch to a CARBOFRAX hearth, service of 3½ years is not unusual. In addition, four times as much work is turned out. Oil consumption has been cut. Time is saved. Maintenance and repairs are minimized. The overall savings in production costs that are realized from the secondary benefits have paid this operator dividends over and above his original expectations.

Foundry specifies CARBOFRAX linings to lower maintenance costs ...gains extra benefits

In this case, CARBOFRAX linings were installed in 14 coke-fired, crucible type melting furnaces for the specific purpose of lowering maintenance costs per pound of aluminum bronze melted. Extended experience revealed that this primary objective was achieved...plus...additional important benefits accruing from distinctive characteristics of these linings. Uniquely resistant to high temperatures, cracking and erosion, original lining dimensions are retained even after extended service. This hard, dense lining prevents clinker adherence and subsequent penetration to eliminate cutting-back or "bellying" on removal of clinker formations. Cleaning is facilitated. Coke consumption is held to a minimum. Made accurately to size, CARBOFRAX blocks are installed quickly.

"Carborundum," "Carbofrax," "Mullfrax," "Silfrax," "Alfrax" are registered trademarks which indicate manufacture by The Carborundum Company

Address all correspondence to: Dept. D-109, THE CARBORUNDUM COMPANY, Refractories Division, Perth Amboy, New Jersey

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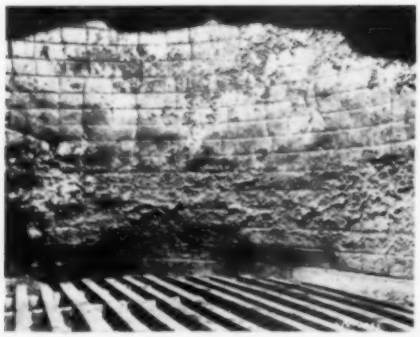
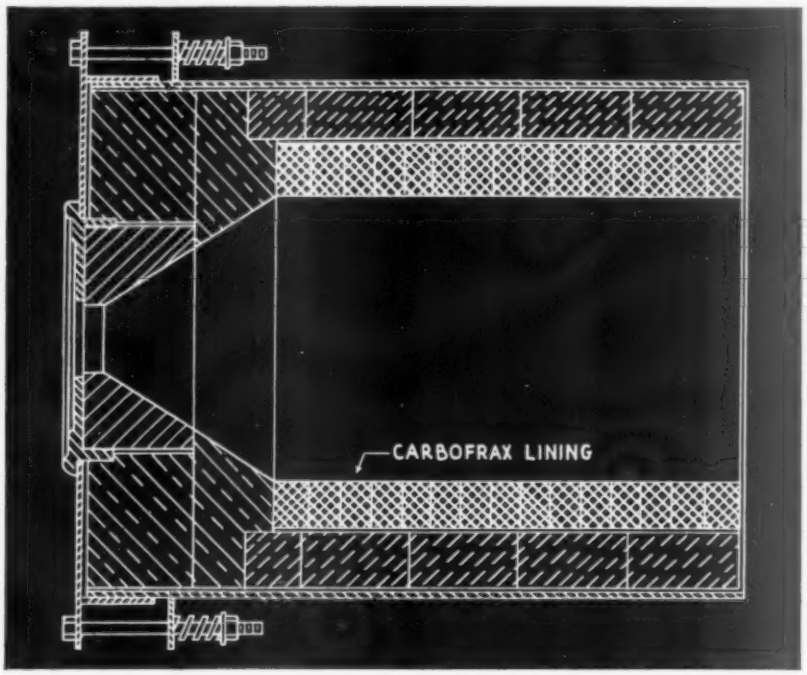
← Continued from other side



Investments to obtain increased Gas Make pays extra dividends

Seeking increased gas make, this operator installed a CARBOFRAX lining in a water gas generator. Thru its use, the full grate area is available longer. Clinkers build-up more slowly on the hard, smooth lining. A more active, uniform fire is obtained. As clinker accumulations are removed in about half the time previously required, down-time is reduced. The hotter set enables a faster resumption of gas production. The dirty, disagreeable clinkering job is made easier by the absence of embedded clinker formations. Moreover, lining service is now 5 times that secured with clay linings.



CARBOFRAX ignition chamber lining proves ideal for rotary driers

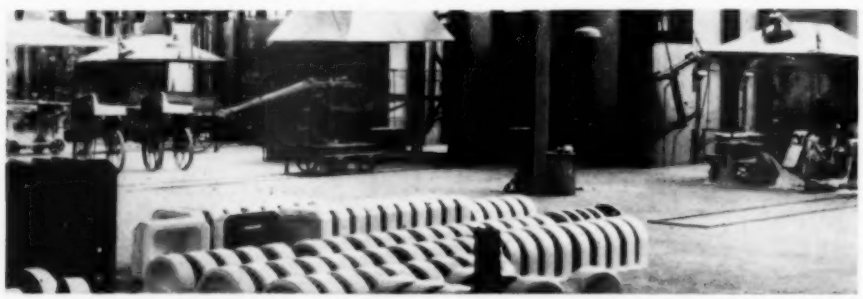
In low temperature rotary driers, oil deposition on the charge is a serious problem often encountered. It usually is caused by huge volumes of incoming air chilling a portion of the projected flame before combustion is completed.

Attempting to correct this condition, an ignition chamber was lined with "CARBOFRAX" brick. Far better fuel vaporization resulted from the hot radiant face of the "CARBOFRAX" lining—all fuel was burned within the combustion chamber. Not only did this solve the carbon problem. The smoke nuisance also was eliminated.

Subsequent installations on driers handling a variety of materials including dolomite, limestone, kaolin clay, etc., confirmed initial experience. On several rock drier jobs fuel consumption dropped from 1½—2 gallons to ½ gallon of oil per ton of rock dried. Moreover, "CARBOFRAX" linings have given at least a year's life compared with 2 to 3 weeks from other type of refractories.

Ceramist gains longer life from Kiln Furniture plus additional advantages

By using CARBOFRAX slabs and setters, this kiln operator increased service life of the shapes to an average of more than 465 trips. Shapes remain straight and true. There is no growth nor cracking due to thermal shock. Necessary rebuilds are cut considerably. And the uniform quality tile guards against premature failure of a few pieces that often account for costly kiln wrecks.



Enameler sought increased production—got it with extra economies

By installing CARBOFRAX muffles and supports in his furnaces, this manufacturer of cast iron sanitary ware stepped up production because of the high thermal conductivity of this material. At the same time, fuel consumption was cut, a more uniform temperature throughout burning chambers is maintained, and a longer muffle life and an increase in the life of the furnaces are realized. These improvements are due to the superior characteristics of CARBOFRAX muffles.

A complete file of informative literature covering super refractories is available through The Carborundum Company. There are facts and figures on installations in specific fields. To obtain copies of reports, booklets and catalogs of particular interest is a simple matter. Merely select from the list printed here. Copies will be sent you at once. No obligation, of course.

Super Refractories by CARBORUNDUM (general catalog)

Super Refractories for the Ceramic Industry

Super Refractories for the Process Industry

Super Refractories for Boiler Furnaces

Super Refractories for Heat Treatment Furnaces

Super Refractories for Gas Generators

The FRAX Line of Cements

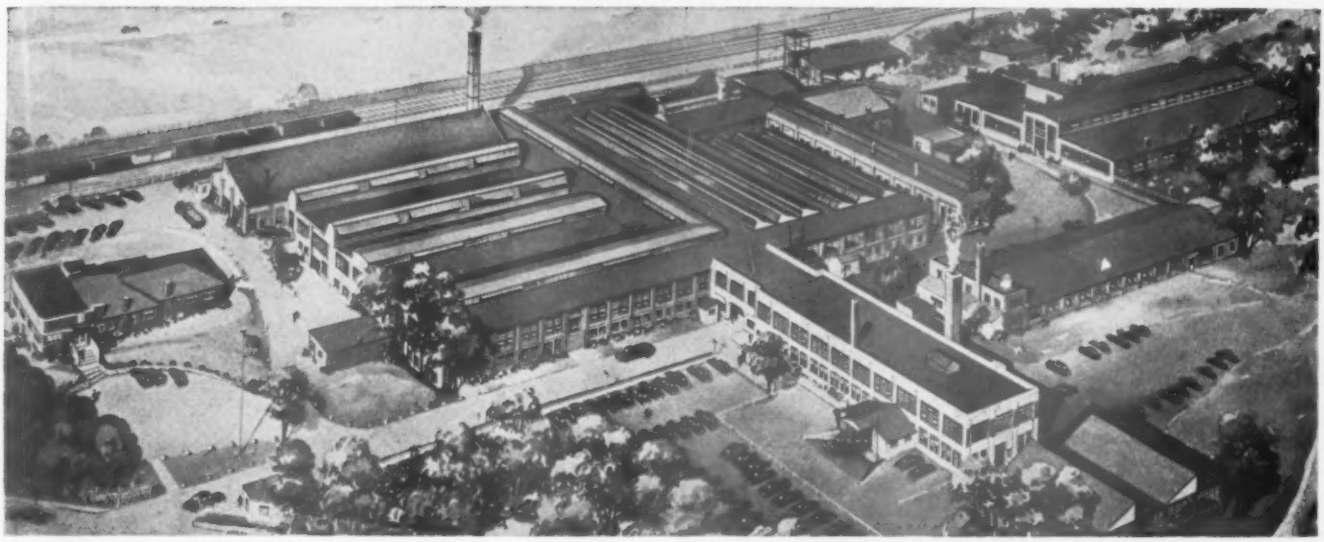
CARBOFRAX Refractory Skid Rails

Bulletins Nos. 1, 2, 3 on Underdrain Systems and Diffuser Media

Dept. No. D-109

THE CARBORUNDUM COMPANY
Refractories Division
PERTH AMBOY, NEW JERSEY

Cleveland builds security in every link!



Factory headquarters and general offices of The Cleveland Chain & Mfg. Co., and its associate, David Round & Son, Cleveland, Ohio. Similar plants are operated by associate companies in Bridgeport, Conn.; Seattle, Wash.; So. San Francisco, Cal., and Trenton, N. J.

SIX plants of The Cleveland Chain & Mfg. Co. and its associate concerns produce chain of every type . . . to meet every home, farm, automotive and industrial chain need.

History of the Cleveland organization, now in its 80th year, is typical of American industry under our free enterprise system.

David Round, company founder, learned his trade as an apprentice in his father's hand-forge chain shop in Staffordshire, England. His first chain works, established in 1869 at Newburgh (near Cleveland), was little more than an enlarged blacksmith shop.

But, Mr. Round's insistence upon master craftsmanship . . . his refusal to compromise with quality resulted in constant business growth.

Today, Cleveland Chain is sold throughout the world . . . preferred by users who demand utmost security in every link.

CLEVELAND CHAIN

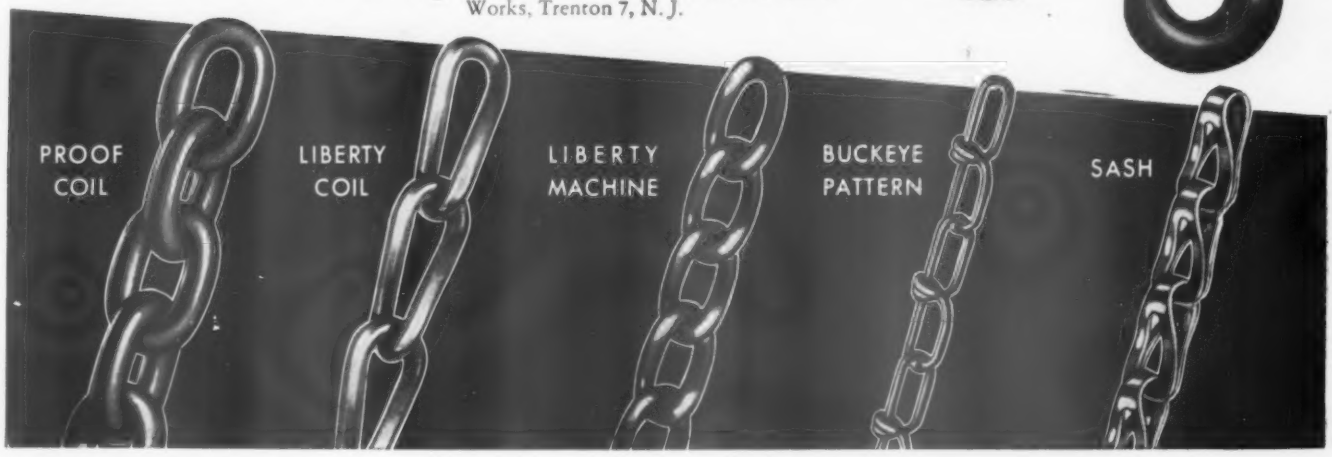
The Cleveland Chain & Mfg. Co.

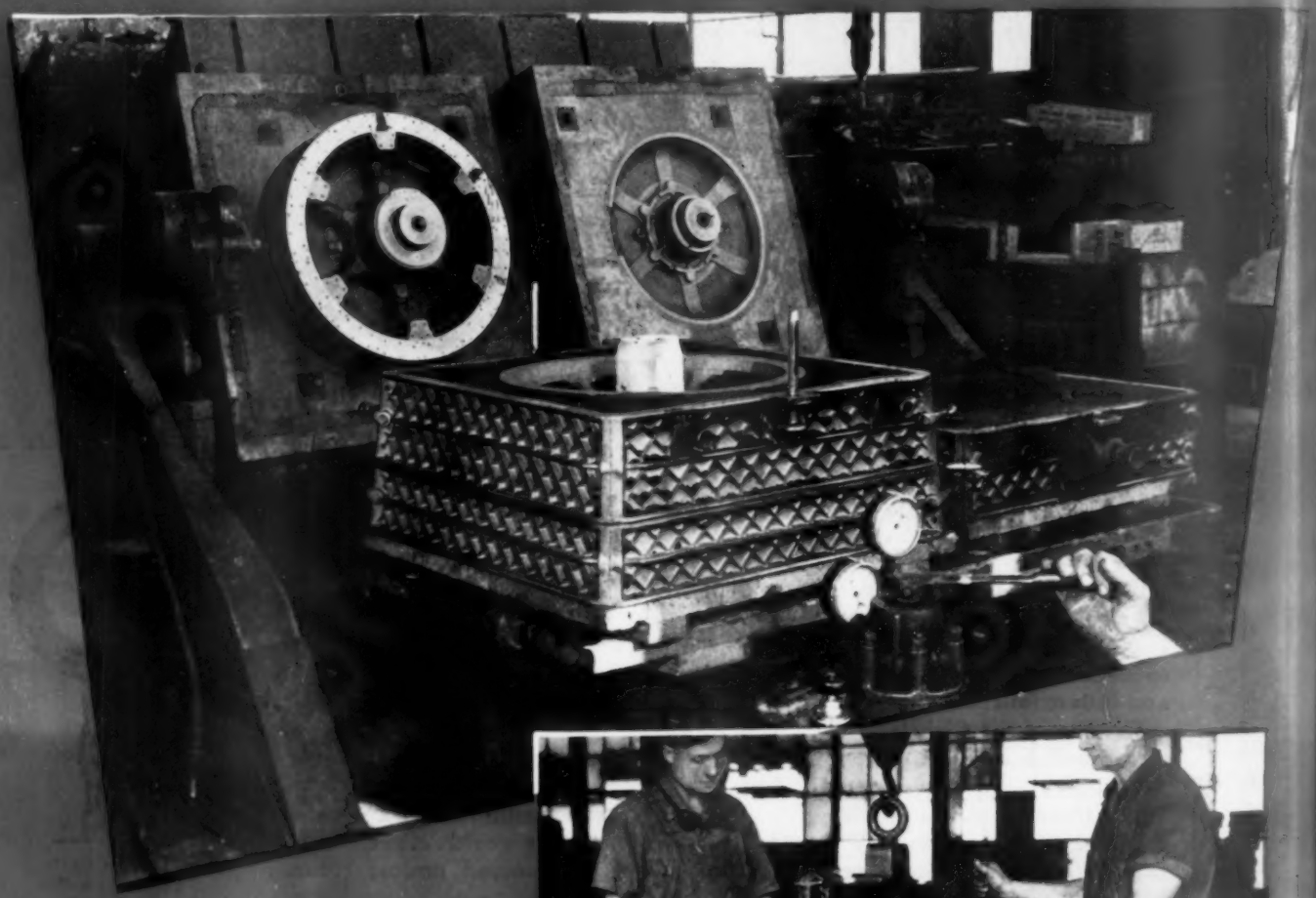
Cleveland 5, Ohio

Associate Companies: David Round & Son, Cleveland 5, Ohio. • The Bridgeport Chain & Mfg. Co., Bridgeport 1, Conn. • Seattle Chain & Mfg. Co., Seattle 8, Wash. • Round California Chain Co., So. San Francisco and Los Angeles 54, California • Woodhouse Chain Works, Trenton 7, N. J.

Since DR *1869*

Certified CHAIN INSTITUTE Member





HINES
POP-OFF
(Trademark Reg. U. S. Pat. Off.)
FLASK

THE HINES

3431 WEST 140th ST.

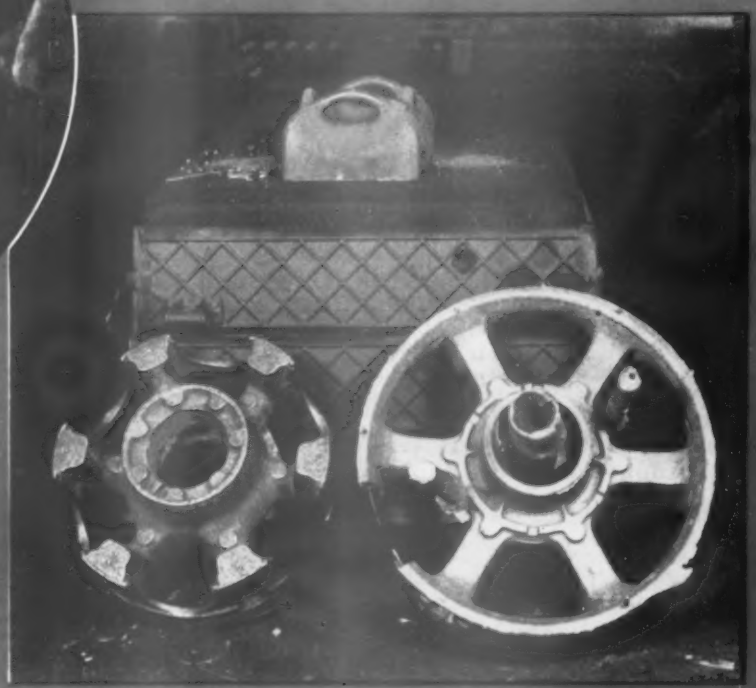
Another Good Example of

Large, Heavy Castings Being Made in

HINES *"Pop-Off"* FLASKS

and poured off in

HINES JACKETS



All Hines Flasks and Jackets are fully protected by patents and patents pending.

S FLASK CO.

CLEVELAND 11, OHIO

WANT A *Squeezer* YOU CAN PUT ON THE SPOT?

WE *mean the top-speed, high-production, don't-let-me-down spot!* That calls for a Tabor Yoke-Type Jar Squeezer. And that's why you're apt to find from one to a battery of these machines wherever castings are made. Foundrymen know a good investment when they see it!

Here's Tabor design at its best, giving foundrymen everything they look for in a Squeezer: steady, uniform squeeze—ease and speed of operation—long life and low upkeep.

Practical design? Just check these five features:

1. Squeezing unit, including guide, is completely enclosed—full protection against dirt and dust.
2. There are no piston rings on the squeeze mechanism—a source of down-time and maintenance expense gone.
3. Wear on squeeze cylinder is so reduced that it won't be necessary, within the conceivable life of the machine, to re-bore or replace this part.
4. It's now impossible, under any circumstances, for the squeeze piston to blow out—a vital safety factor.
5. Entire squeezing or jarring unit may be quickly detached from the machine for easy inspection.

You'll agree there's something good here for you. The machines are in stock. We invite your inquiry.

Diam. Squeeze Cylinder	Table Size	Space Between Uprights
10″	18″ x 20″	32″
13″	18″ x 24″	36″

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive Street, St. Louis 1, Mo.; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

MANUFACTURERS ASSOCIATION FOUNDRY EQUIPMENT

The TABOR *Manufacturing Co.*

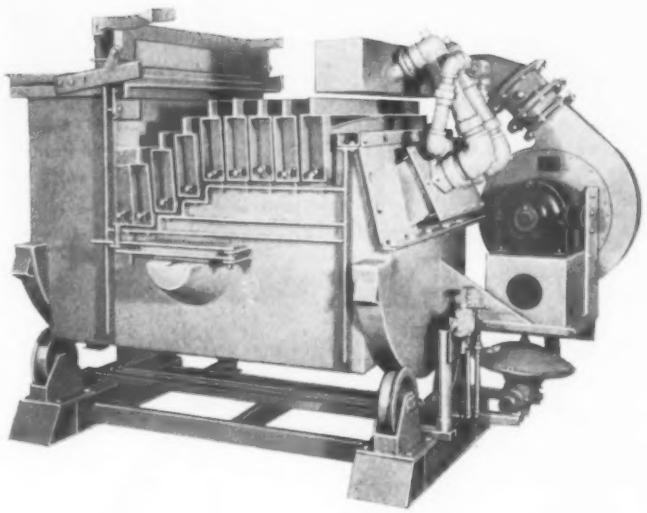
SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

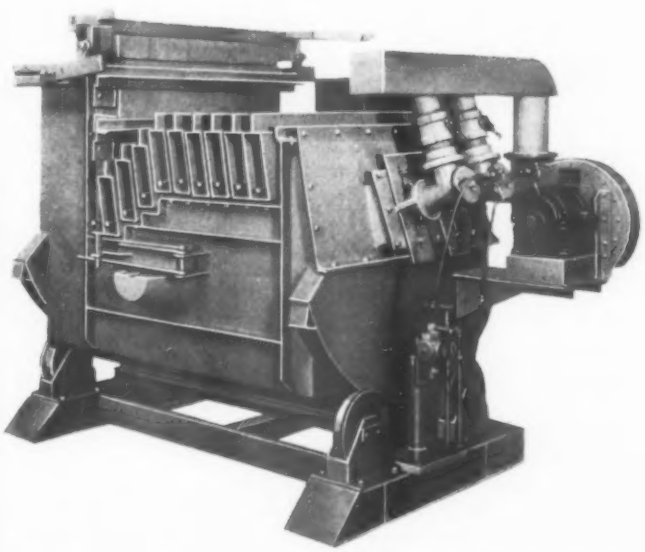
LOOK! GRAY IRON FOUNDRYMEN!

DAILY, PROFITABLE OPERATION DURING SLOW TIMES OR PEAK PERIODS WITH THESE SENSATIONAL NEW STROMAN ECONOMELT FURNACES

Here's What You Can Count On:

1. Flexibility
2. Controlled analysis of iron
3. Prompt service to customers
4. Control of physical properties
5. Turnover of molding floors and flask equipment several times daily
6. Full use of a minimum amount of labor
7. Temperatures in excess of 2800° F. easily attained
8. Excellent for use on special analysis and alloy irons
9. Sizes up to 5000 lbs. capacity per heat





Being able to pour off your floors several times daily eliminates the necessity of bringing in a full crew of men to keep an iron foundry operating daily. With an Economelt all that is needed is a short preheating period at the beginning of each day. One and one-half hours after the first charge molten metal will be ready to pour into the molds. This means that the molding floor and flask equipment can be turned over several times a day, enabling you to give your customers excellent service.

Chemical analysis can be controlled very closely with Stroman Economelt Furnaces, therefore affording good physical properties on all castings. This assures your customers of a good machinable product. With this unit you can meet competition with a quality product and maintain low production costs, which assure greater profits.

INVESTIGATE these Stroman Economelt Furnaces for Gray Iron . . . they have proved their efficiency and are now in operation in many gray iron foundries . . . Drop a note for full information . . . Do it to-day.

STROMAN FURNACE & ENGINEERING CO.

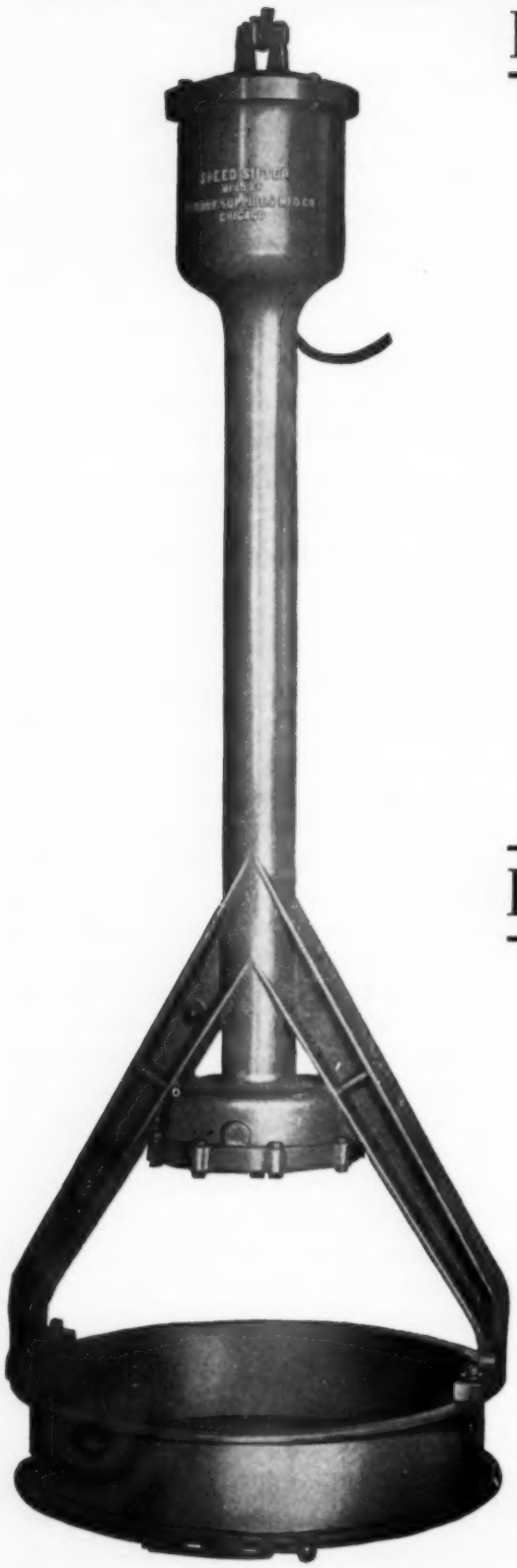
DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

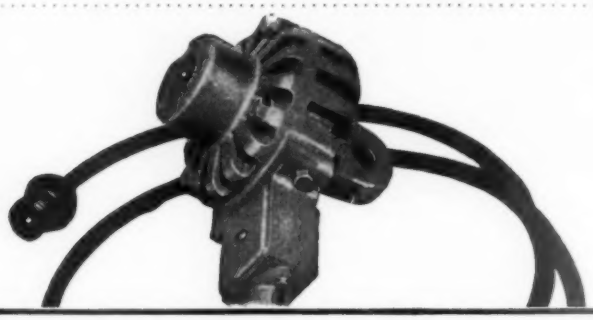
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$245.00 f.o.b. Chicago—complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase and 220 volt, 1 or 3 phase.

UNIVERSAL FREE - WHEELING RIDDLE equipped with motor as above $225.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$11.00
No. 2—Medium match plate work	13.60
No. 5—Heavy match plate, tub and bench work	18.40
No. 9—Machine and heavier work	26.80

Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators:
Single pole $5.00, Double pole $6.50.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

What's Your Bulk Handling Problem?

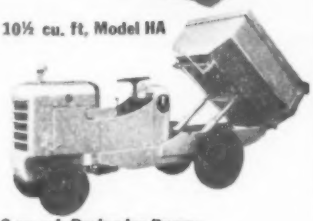
Foundries use
PAYLOADERS
to Handle . . .

Sand • Scrap
Slag • Sprues
Coke • Castings
Limestone
Abrasives
Waste • Brick
Clay • Chips
Borings • Turnings

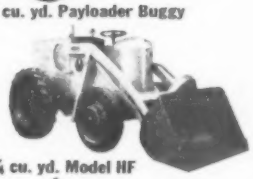
Model HA Payloader loading a rattler in a Georgia foundry.

Unload Box Cars—Carry, Spread and Windrow Sand—Load Trucks—Charge Hoppers—Fill Bins

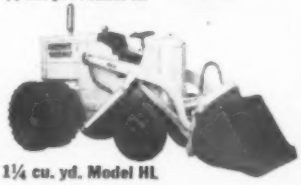
10½ cu. ft. Model HA



2 cu. yd. Payloader Buggy



¾ cu. yd. Model HF



1¼ cu. yd. Model HL

Bulk materials of any kind can become bottlenecks in any plant. They can also "hog" valuable floor space and discourage good plant housekeeping. Makeshift handling methods result in fatigue and physical injuries . . . slow down your operations and raise the cost of your production.

Hough PAYLOADERS are *designed* and built to provide a fast, flexible materials handling system . . . to cut time and costs . . . to boost output per manhour. PAYLOADERS are equipped to increase your production area by reducing your present storage space — to handle the largest loads per operation — to bring neatness into your plant. It's easy to pick up full loads of any bulk material with a PAYLOADER. It's easy to load your materials into hoppers or bins — high or low — by means of its quiet and dust-reducing hydraulic dumping mechanism.

PAYLOADERS also pay an extra bonus by doing many odd chores . . . pushing, pulling, lifting, spotting cars, loading and plowing snow, cleaning yards, leveling waste dumps and grading.

FREE LITERATURE on any units of the complete PAYLOADER line is yours for the asking.

PAYLOADERS are dependable — because they are the result of materials handling experience since 1920.

The Frank G. Hough Co., 703 Sunnyside Ave.
Libertyville, Illinois

SAY HUFF

HOUGH
PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.

P&H Cupola Chargers

Engineered

to your SPECIAL requirements

By the World's Largest Builder of Cranes and Hoists

In service P&H Cupola Chargers save again by contributing to lower cost foundry operations. Modern in every detail, they permit controlled or fixed charging with maximum efficiency and safety.

SAVED $36,164.16

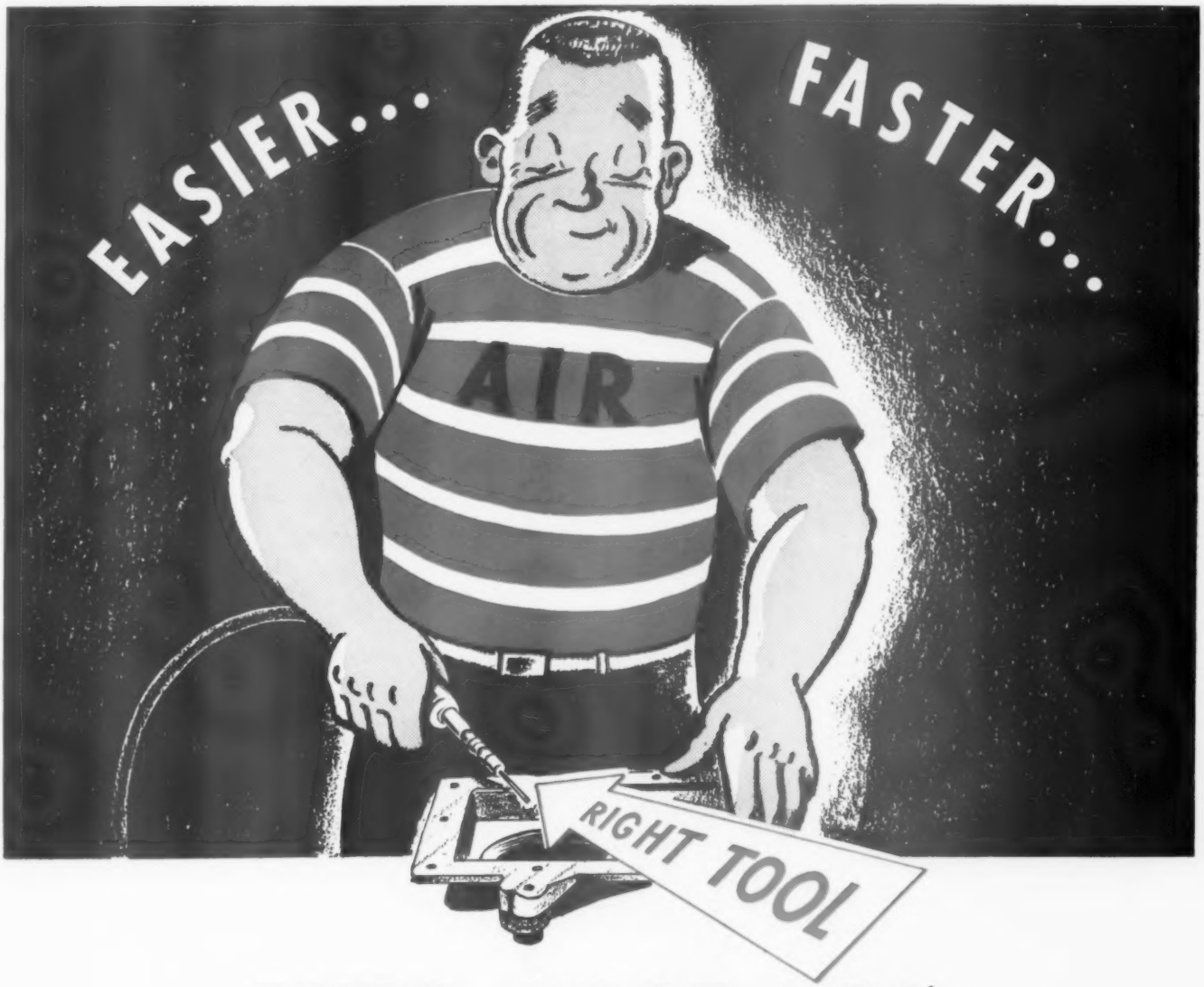
For example, note the above P&H installation. In the first year $36,164.16 was saved over former methods by this combination P&H Cupola Charger and Gantry Crane. The magnet crane, serving a large area, unloads materials, also assembles and accurately makes up the proper charges.

Whatever your size, whatever your needs, write P&H today and learn how these savings apply to your operations.

P&H CUPOLA CHARGERS
4405 W. National Ave.
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

OVERHEAD CRANES · HOISTS · EXCAVATORS · ARC WELDERS and ELECTRODES · SOIL STABILIZER · CRAWLER and TRUCK CRANES · DIESEL ENGINES · CANE LOADERS · PREASSEMBLED HOMES



CUTS COST 50%

HAND files and scrapers were being used by this manufacturer of railroad equipment for filing sharp machine edges and burrs on bronze castings. The Rotor Application Engineer suggested doing it the easy way with a Rotor M-827 midget grinder with rotary file. This 20,000 R.P.M., 1⅛ lb. Rotor air tool was installed and gave these results:

50% reduction in burring costs because high-speed, light-weight Rotor midget file doubles production compared to former hand operation.

A more uniform, smoother finish because this rotary power file is easy to handle and reaches places inaccessible with hand files.

Perhaps you have hand filing operations which could be done quicker and better with these high-speed, light-weight tools. Let the Rotor Application Engineer suggest ways to decrease your costs by increasing your output per man per dollar.

Yours for smoother filing,

AIR O'TOOL

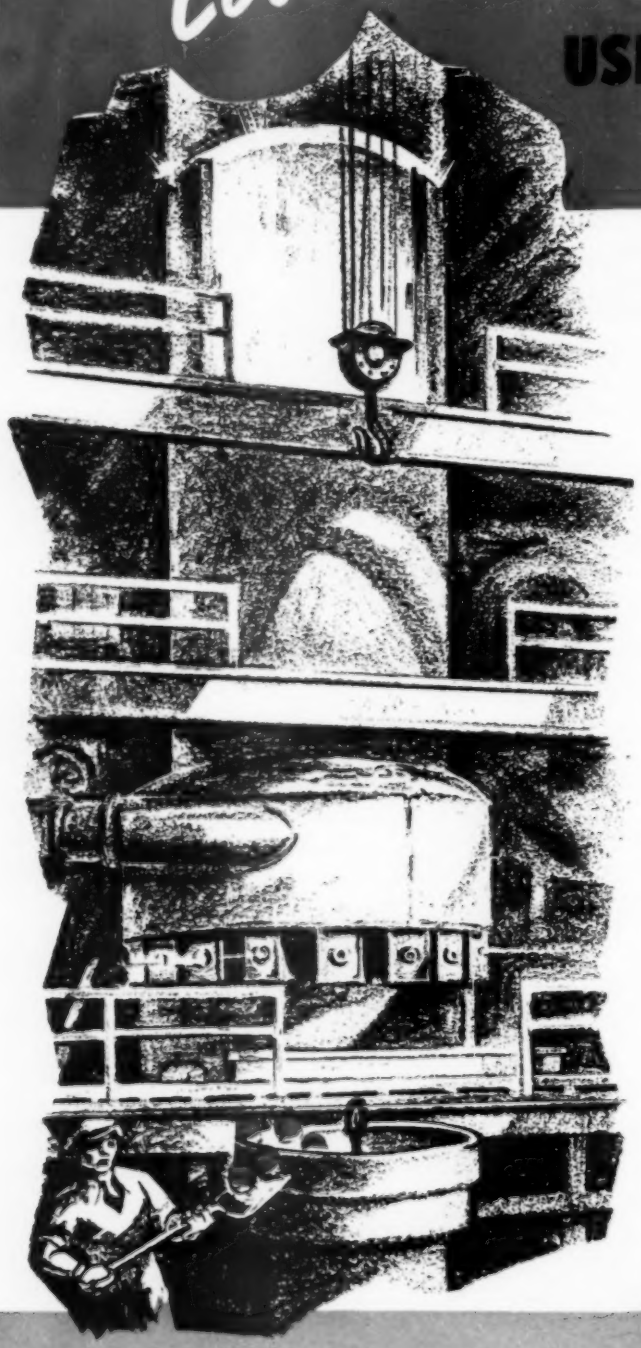
THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

FOR *ECONOMICAL* CUPOLA OPERATION

USE OHIO FERRO-ALLOYS BRIQUETS



Economy is an important factor in every cupola operation. It will pay you to consider the advantages and resultant savings on material costs made possible by the use of Ohio Ferro-Alloys Briquets.

You may select the most economical charge of scrap and pig iron and adjust the analysis with these Briquets.

THE FOLLOWING ARE AVAILABLE

Kind of Ohio Ferro-Alloys Briquet	Color	Contained Alloy
Silicon	black	Two Sizes { 1 lb. Silicon / 2 lb. Silicon
Silico-Manganese	yellow	½ lb. Silicon and 2 lb. Manganese
Manganese	red	2 lb. Manganese
Chrome	green	2 lb. Chromium

Ohio Ferro-Alloys Briquets are available in bulk or in barrels. They are available also in cartons of 24 briquets for easy handling and accurate inventory control.

© OFA 1935 PHILO DEPENDABILITY QUALITY SERVICE RAINIER DEPENDABILITY QUALITY SERVICE © OFA 1941

FERRO - SILICON 25 - 50 - 75 - 85 - 90%
SPECIAL BLOCKING 50% FERRO - SILICON
LOW CARBON FERRO - CHROME SILICON
HIGH CARBON FERRO - CHROME
FERRO - MANGANESE BOROSIL SIMANAL

BRIQUETS
SILICON • MANGANESE • CHROME
SILICO - MANGANESE

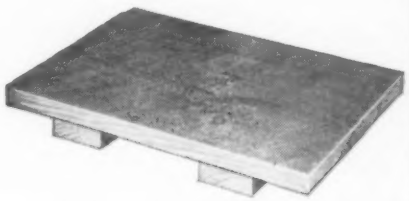
Ohio Ferro-Alloys Corporation
Canton, Ohio
Chicago Detroit Pittsburgh San Francisco Tacoma

Plants and Warehouse at Philo, Ohio and Tacoma, Washington.
Sales Agents and Warehouse for San Francisco Area:
Pacific Graphite Co., Inc., Oakland 8, California.
Sales Agents and Warehouse for Los Angeles Area:
Snyder Foundry Supply Co., Los Angeles 11, California.

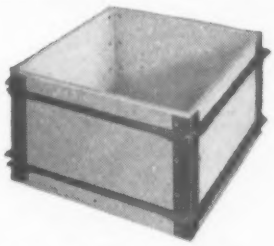
CMD FOUNDRY SPECIALTIES

WEDGES
Hard or soft wood

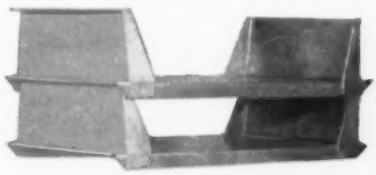
CMD WOOD FLOOR FLASKS
All sizes and shapes



CMD WOOD BOTTOM BOARDS
All sizes and shapes



CMD NON-WARP, NON-BURN SLIP JACKETS



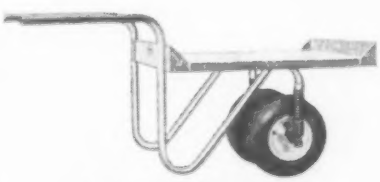
CMD DUAL-PURPOSE CORE TRAYS

CMD TYPE F CHIPPING HAMMER
Metal handle. Head has 2 chisels at right angles

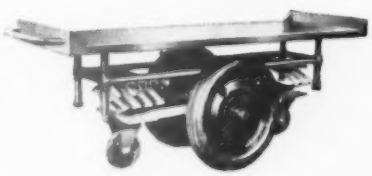
CMD TYPE A CHIPPING HAMMER
Combination drift and chisel

CMD TYPE C CHIPPING HAMMER
For general hand chipping

TEXTITE AIR SEPARATOR
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.



CMD PNEUMATIC CORE BARROWS
With single wheel or two wheels. (as shown here)



CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage

WRITE FOR BULLETINS
On CMD core-conveying equipment and other foundry specialties—preferred by experienced foundrymen for 25 years.

CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

1928 WEST 46th STREET CHICAGO 9, ILLINOIS

Only AJAX

LO-VEYORS

GIVE YOU ALL THESE COST-CUTTING FEATURES

The exclusive Ajax design principles are responsible for the low maintenance cost and, in turn, low material handling costs.

1. 3 basic parts—the pan or tube . . . the vibrating or shaking mechanism . . . the motor, variable speed drive or other source of power to drive the shaker.

2. Completely self-contained, ready to use.

3. Completely enclosed drive unit with only 2 working parts.

4. Conveyor pan supported by flat springs mounted in rubber bushings,—no exposed bearings, no eccentric shafts, idler and tail pulleys.

5. Pan or tube can be made of ferrous or non-ferrous metal and can be lined or coated for protection against contamination.

6. Pans available with or without covers.

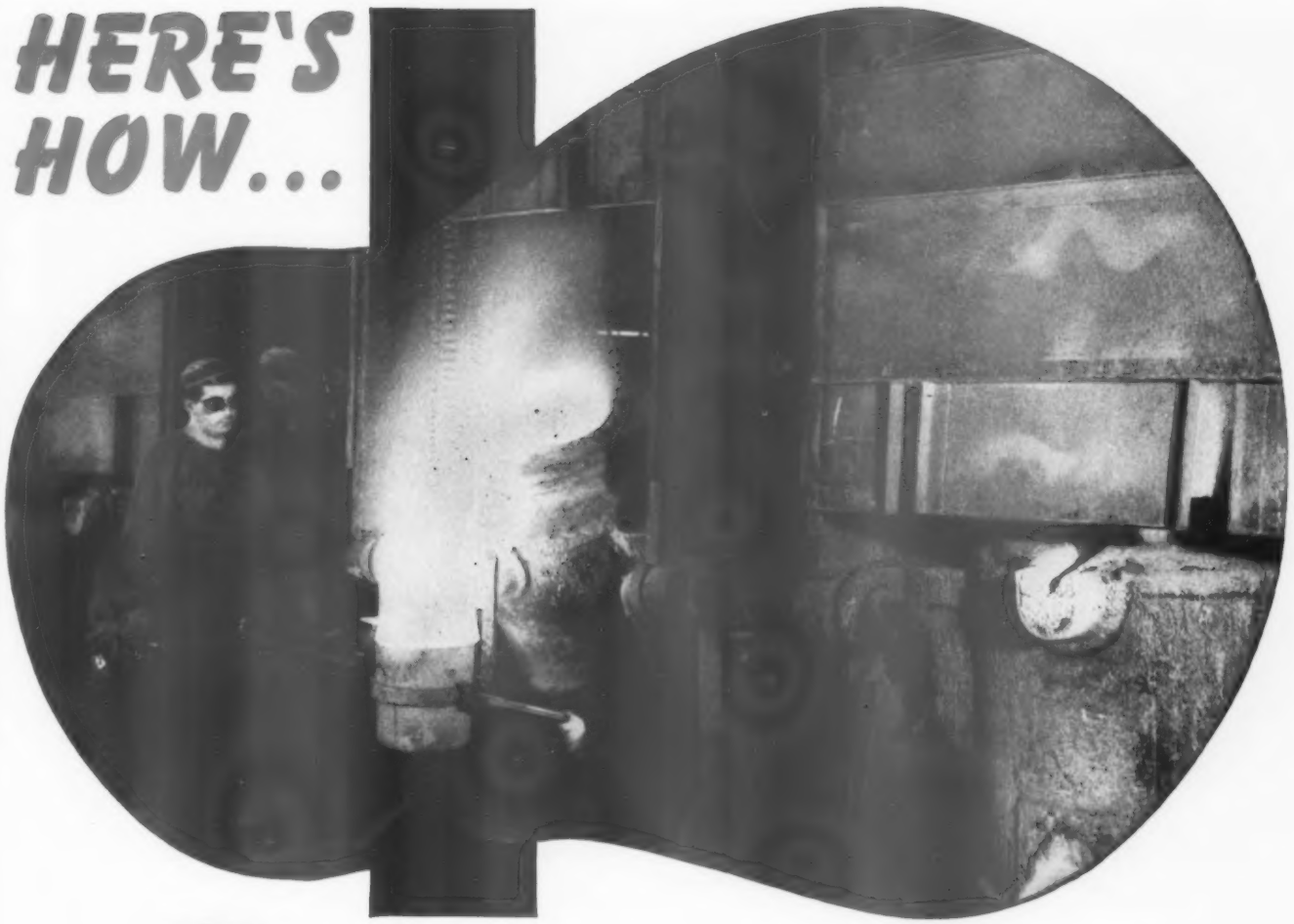
7. Tubular conveyors provide gas-tight construction for critical process and explosive operations.

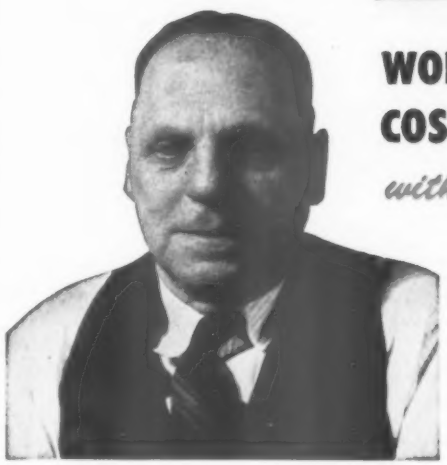
Write giving outline and sketch of your requirements for handling dry aggregates.

AJAX FLEXIBLE COUPLING CO. INC.

CONVEYOR AND SCREEN DIVISION • WESTFIELD, N. Y.

HERE'S HOW...





WOLVERINE BRASS WORKS REDUCES MAINTENANCE COSTS 80% — METAL LOSS TO 1%!

with LINDBERG-Fisher Tilting Furnaces!

Wolverine Brass Works, Grand Rapids, Michigan, prominent manufacturer of plumbing goods reports maintenance costs reduced 80%. Wolverine Brass installed Lindberg-Fisher Tilting Crucible Furnaces in their melting and pouring departments—they have operated these furnaces 9 hours a day, 5 days a week for 8 years. Their experiences show cleaner operation, increased safety, lower production costs, and greatly reduced maintenance costs and metal loss.

Mr. Fred H. Papke, Foundry Supt. says: "We like the Lindberg-Fisher furnaces because we can equip them with hoods in back and front, protecting the men from the smoke of the zinc fumes. Overflow or spillage metal is caught in easily cleaned basins and recovered at the end of each day. Lindberg-Fisher furnaces are easy to reline, and insert crucibles. Furnace covers move back and forth for easy repair. In my foundry experience on nonferrous metal, I find the Lindberg-Fisher furnaces economical and highly efficient."

HERE'S HOW:

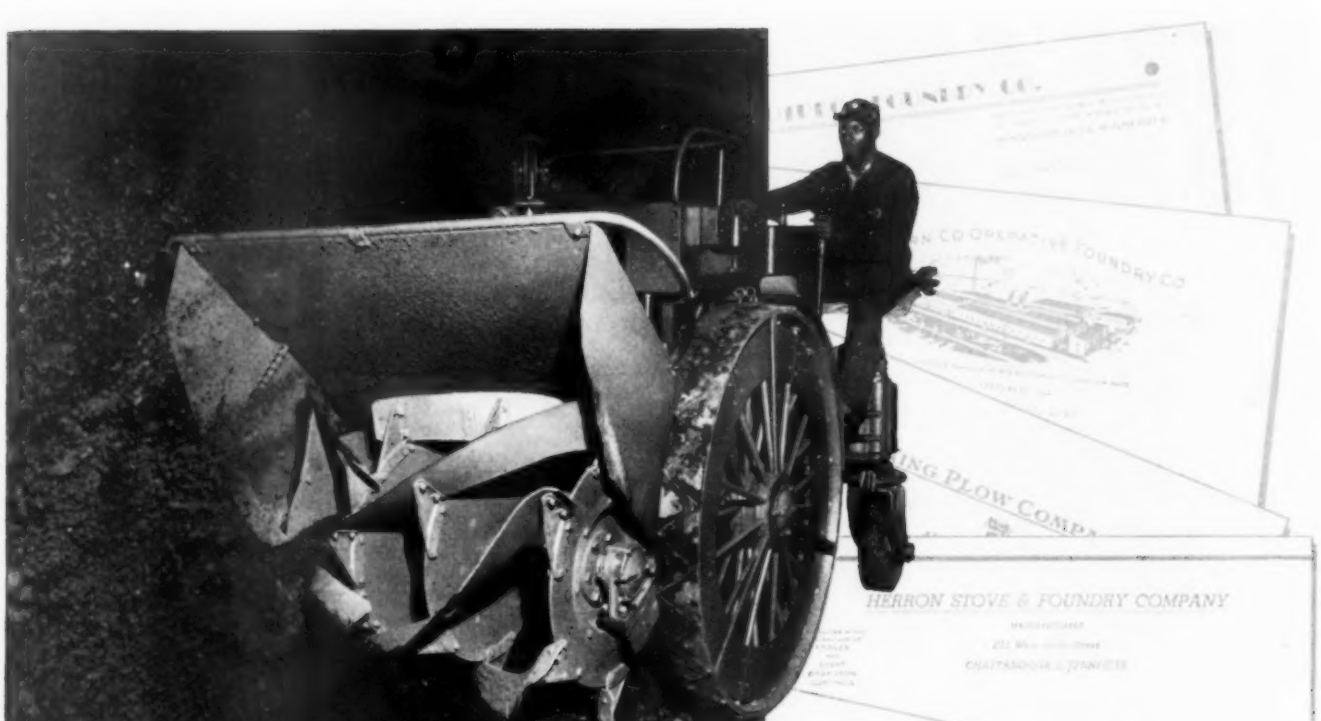
Equipment	12 Lindberg-Fisher Tilting Furnaces
Heats per day	7.0 heats per furnace
Lbs. per heat	606
Crucible life	131.5 heats per crucible
Metal loss	1% of total production

For full details call your local Lindberg-Fisher representative or write for Bulletin No. 57-A.

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

2453 West Hubbard Street, Chicago 12, Illinois



"the SANDCUTTER has more than PAID FOR ITSELF"

There is one point on which all foundrymen agree: Any piece of equipment that will pay for itself QUICKLY . . . and then continue to provide substantial savings . . . is well worth its original cost. If letters from users are any indication, then the Sandcutter is a gilt-edge investment. Typical of the comments of Sandcutter users are the following excerpts from recent letters:

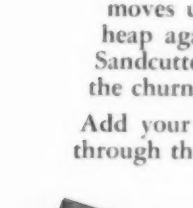
"We feel that we are saving approximately $45.00 each day and making it much easier for the men since installing the Sandcutter."

"The cost of the Sandcutter has more than paid for itself to date. Absenteeism was formerly a serious condition with the night crew, and now, since we have disposed of the "back breaking labor" of continuous shoveling, we have also disposed of our absentee problem."

"Before the purchase of the AM Sandcutter, we had a large crew of men cutting our sand by hand . . . . Now one man with the Sandcutter cuts all our sand including the facing which previously took two alone."

The Sandcutter reduces the cost of sand conditioning because it is faster and requires less labor to operate. There is no hand shoveling required. The Sandcutter moves up and down the molding floors, its whirling blades cutting through every heap again and again. There is no equaling the condition of the sand cut with a Sandcutter. Dry spots, wet spots, lumps and pockets of new sand cannot escape the churning, blending action of the cutting cylinder.

Add your name to the growing list of foundries that are increasing their profits through the use of Sandcutter. Write today.



Write for Complete Catalog

The "American Line" catalog illustrates and describes every Sandcutter model as well as all other American Products. Send for your free copy today.

American Sandcutters

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka 2, Ind.

If it's CAST IRON you can weld it with NI-ROD

NI-ROD WELDING ELECTRODES SUCCESSFULLY BUILT UP THIS WORN DIE

WHAT NI-ROD GIVES YOU

—in performance

- Stable arc in all positions
- Smooth bead contour
- Excellent "wash"
- Easy slag removal
- Preheating seldom required
- Works on either a.c. or d.c.

—in Weld Quality

- High-strength deposit
- Easy machinability
- Thorough fusion
- Freedom from cracks and porosity
- Close color match

Dished heads are just one of the products of Lukens Steel Company, Coatesville, Pa.

They're formed with large hemispherical dies. Dies made of cast iron. Dies that are fairly expensive. When one wears down, Lukens' maintenance men try to restore the original contours.

For several years Lukens had used brazing to build up the worn areas. Then they tried Ni-Rod* welding electrodes because of good reports on its strength and easy machinability.

Here's what Lukens has to say about this repair job:

> **"With other wires, it was found that welds would pull loose from the casting when in use. Ni-Rod was the only electrode that could be used successfully. It would not pull loose when in operation, and had a very good wearing quality. We now use Ni-Rod for building up dies to insure good wear and where pressure on the die is involved."**

The welded die (before machining) is shown at the left. Note the smooth layer of Ni-Rod beads. Proof of Ni-Rod's easy handling!

Time and time again, Ni-Rod can save you money in repairing damaged iron castings; in building up worn areas; in correcting machining errors; on the production line to join cast iron to steel.

*Reg. U. S. Pat. Off.

EMBLEM OF SERVICE

INCO NI-ROD TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

GET NI-ROD FROM:

Whitehead Metal Products Company, Inc.
Steel Sales Corp. — Williams and Company
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Wilkinson Company, Ltd. — Metal & Thermit Corporation
Hollup Corporation — National Cylinder Gas Company

STERL

WHERE ELECTRIC OVENS ON RUSH GRINDING WHEEL DELIVERY

Among the important goals already reached by Sterling's Research and Development Program is that of quicker delivery. The use of many extra electric ovens, plus unusual technical and manufacturing advancement, has resulted in more and more Sterling Grinding Wheels being the natural choice of production minded executives throughout the industry.

There is something different about Sterling's New Research and Development Program. Its many phases work together to provide longer-lasting abrasive tools, built to the special demands of your jobs. You will enjoy better results from the "Wheels of Industry", whether it be rough work or precision grinding, because Sterling offers the most modern, precise manufacturing setup available anywhere.

The benefits of the many years of planning behind Sterling's production methods can be yours by simply calling for the services of a Sterling engineer. There is a quick solution possible for that troublesome grinding problem. May we serve you?

STERLING RESEARCH AND DEVELOPMENT IN ACTION

FIRST STEP

Portable grinding can be a tough job if the wrong wheel is being used. Checking up periodically with a Sterling engineer is good policy.

SECOND STEP

A detailed study of your grinding problem always provides the Sterling engineer with data important in creating the proper wheel.

THIRD STEP

A series of test wheels forms the basis for the final specifications recommended by Sterling laboratory technicians and engineers.

FOURTH STEP

Proof of the value of Sterling Research and Development is found in better results from a wheel planned for the job.

THE STERLING GRINDING WHEEL DIVISION

of

THE CLEVELAND QUARRIES CO.

TIFFIN, OHIO

Since 1885, Manufacturers of "The Wheels of Industry"

Branches: Boston, Chicago, Cleveland, Detroit, Los Angeles, Philadelphia, New York. Distributors In All Cities.

ING CONTROLLED SCHEDULES EXTRA DAYS AHEAD . . . .

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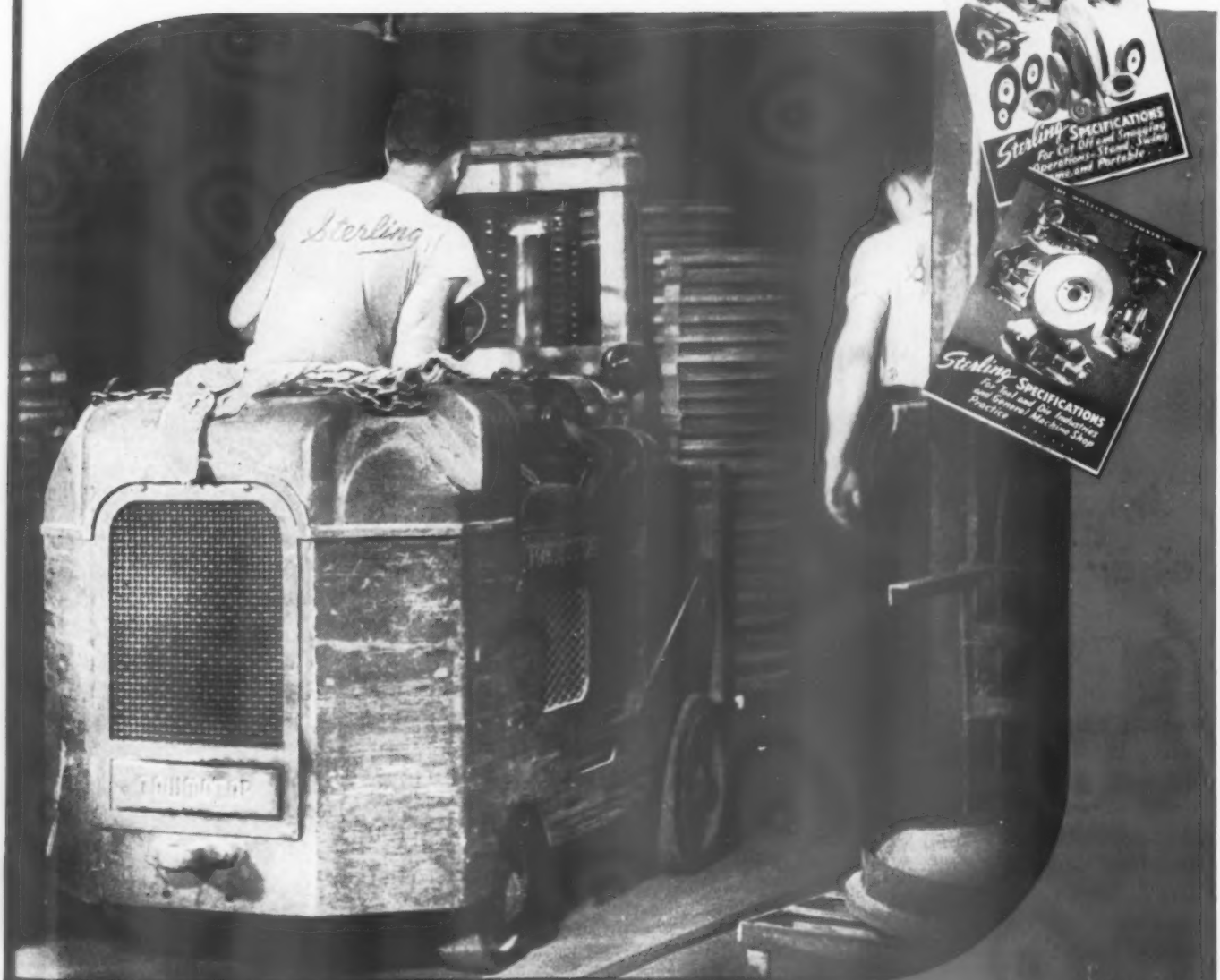
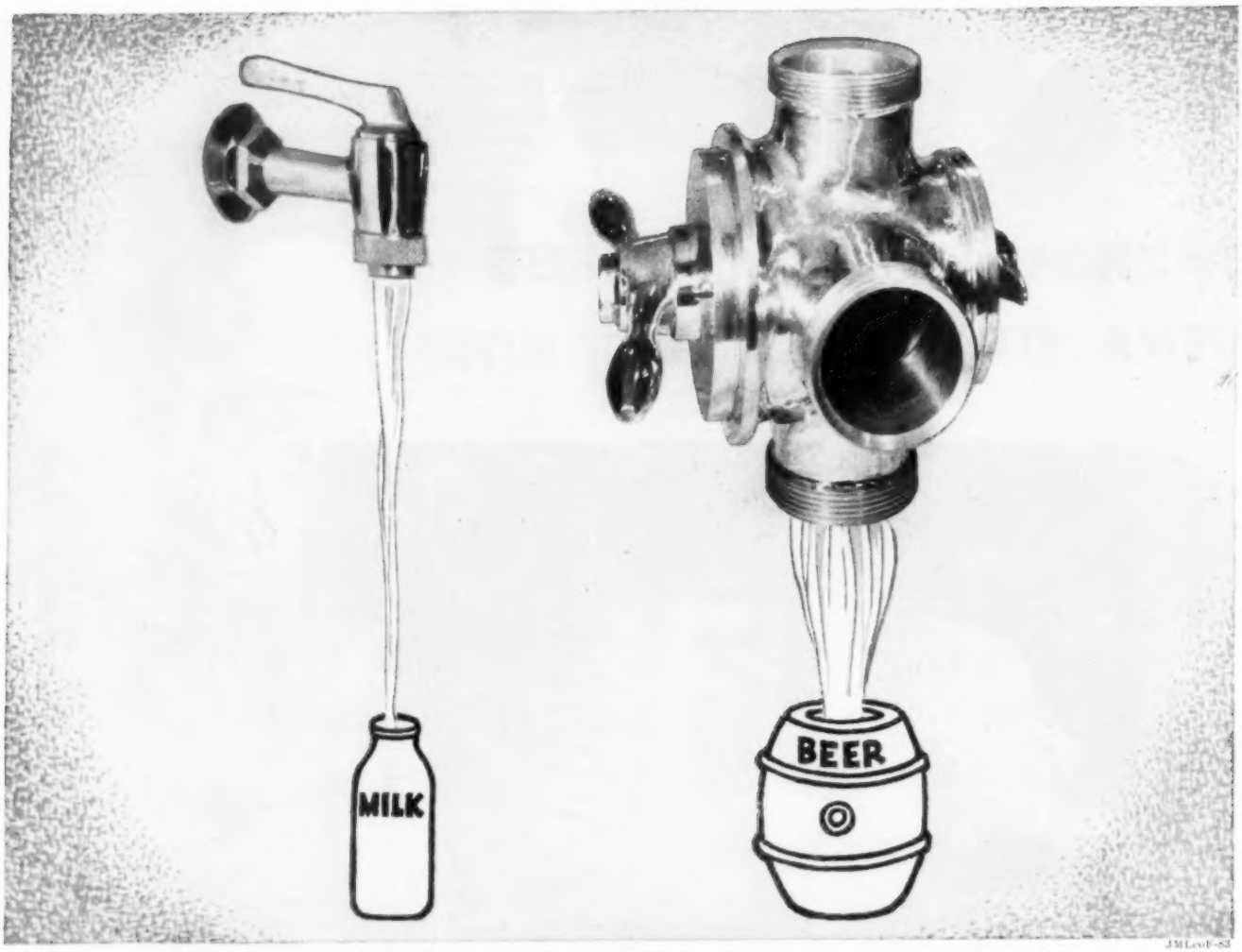


STERLING'S PRODUCTION DEVELOPMENT TECHNIQUE

Doing things faster is everyday procedure at Sterling. Here, skilled workers are placing the "Wheels of Industry" for quicker heat treatment in an electric oven, thereby cutting days off normal delivery schedules.

"THE WHEELS OF INDUSTRY"
STERLING
GRINDING WHEELS



PERFECT METAL–PERFECT CASTINGS!

The small valve is for the dairy industry: the large one for the brewery field. Both are cast of Federated Nickel Silver . . . for very good reason.

Since 1912 the Specialty Brass Company, Kenosha, Wisconsin, has been making castings for dairy equipment. Then, and even more so now, the demands of this food industry forbid the use of castings with even the slightest blemish. Brewery equipment must likewise be virtually perfect.

To produce such castings consistently . . . and to be famous for it . . . Specialty Brass uses the best in methods, and the *best in materials*. Specialty uses Federated Nickel Silver exclusively.

Nickel silver alloys are particularly suited for use where high corrosion resistance and silvery white color are important. Federated metallurgists can tell you exactly what alloy fits your need. They are ready and willing to help out in your foundry, too, should casting problems arise.

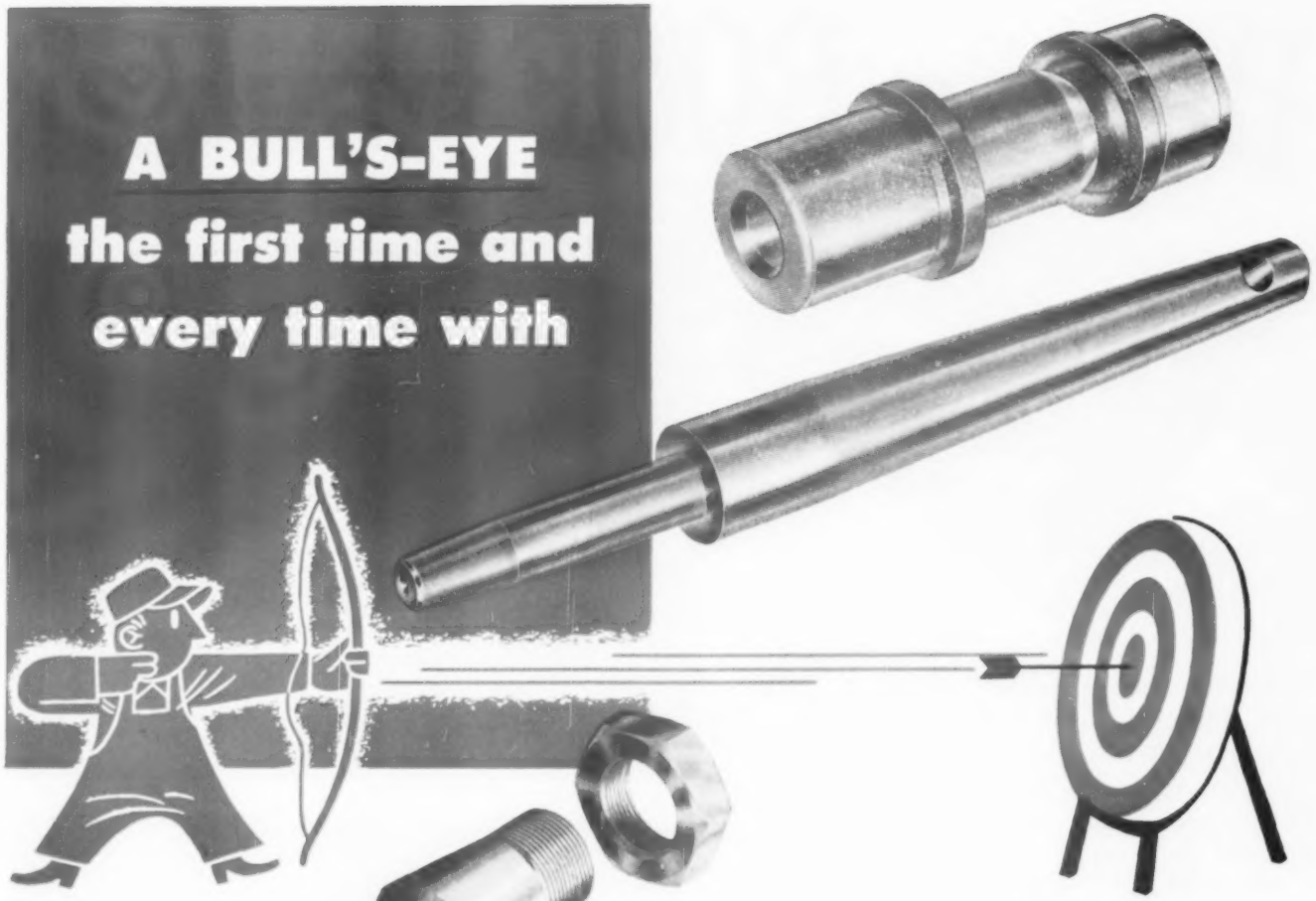
For nickel silvers; brasses and bronzes; aluminum and magnesium alloys; solders; babbitts; fabricated lead products; for any non-ferrous metals, see Federated first.

Federated first in the non-ferrous field FMD

Federated METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY, 120 BROADWAY, NEW YORK 5, N. Y.

A BULL'S-EYE the first time and every time with



UNIVERSAL FLASK PINS and BUSHINGS for cope and drag

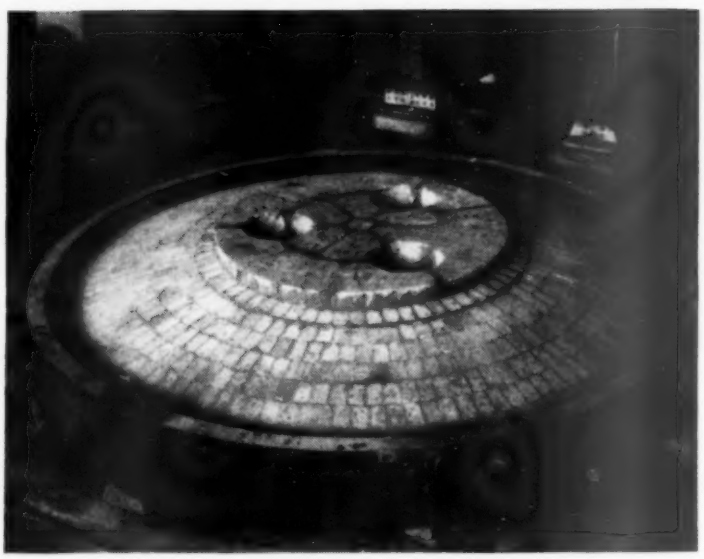
Cope and drag alignment troubles are a thing of the past once you install Universal precision made standardized Flask Pins and Bushings. When Universal closing pins are used, *valuable production time is saved on each operation* because Cope Bushings are quickly guided to the Drag Pins. Universal Flask Pins and Bushings are hardened and ground for *maximum resistance to wear,* adding greatly to their productive life. Design permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Universal Flask Pins and Bushings are made in standard sizes and shapes. Special types and sizes to order. *Write for illustrated folder.*

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

Having ROOF trouble?

Use TASIL to prolong roof life of direct arc furnaces



• When operating conditions are just too rugged for ordinary refractories, Taylor Sillimanite (TASIL) is being installed and increasing roof life on Direct Arc Furnaces at lower refractory cost per ton. TASIL can do the same for you.

Roofs formed of TASIL ramming mix, bricks and special shapes are in service today on furnaces ranging in size from 50 pounds to giant 50 ton units, melting a great variety of steels and alloys. TASIL specified for:

High Softening Point
P. C. E. of Cone 38 (3335° F.) or 200 to 300° F. above those of the best grades of silica, super-duty silica, fire clay and super-duty fire brick.

High Hot Strength
No gradual softening below the critical point.

High Spalling Resistance
No loss in Standard ASTM Panel Spalling Test.

Chemical Stability
Attacked by high iron slags, but more slowly than fire clay base, silica or other high alumina refractories.

The initial cost of TASIL is slightly higher, but when that all-important denominator—REFRACTORY COST PER TON OR PER HEAT—is calculated, TASIL costs LESS.

Contact the Taylor representative in your area or write us direct to get the facts on the savings possible in YOUR plant.

Refractorers to industry since 1864.

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
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The CHAS. TAYLOR SONS Co.
MANUFACTURERS OF REFRACTORIES • CINCINNATI • OHIO • U. S. A.

TESTS PROVE

PATENTED*

Malleabrasive CUTS

SHOT COSTS 35% TO 45%

for Cortland Forging Division of Brewer-Titchener Corporation

35% saved on shot costs alone! That's the result of Cortland's *first* 30-day test of *Malleabrasive* in their blast cleaning operations!

"It's too good to be true!" says the superintendent, 35% savings on shot is major league stuff. Put it back on test for another 30-days. Then we'll see!"

45% *savings on shot this time!* 70% saved on replacement parts . . . plus a finish 100% free of scale! That's the result of the *second* 30-day test . . . even greater, more conclusive proof of Malleabrasive's terrific cost-cutting performance!

You, Too, Can Cut Your Shot Costs

Malleabrasive can cut your blast cleaning costs as much as 50% because it differs from every type of shot and grit on the market today. It's more than "heat treated" or "annealed" . . . *Malleabrasive is guaranteed* to out-perform ordinary shot and grit, when comparative tests are properly run. *Get the facts.* Send for your free copy of recent Malleabrasive test results. THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new orange striped 100 pound bags.

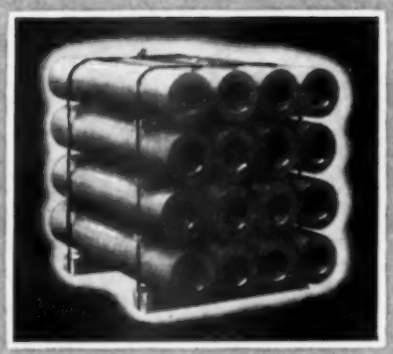
Malleabrasive

*U.S. Patent #2184926 (other patents pending.)

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

. MANUFACTURERS OF METAL ABRASIVES SINCE 1907 .

NEW IDEAS AN OLD STORY AT INTERNATIONAL



For years International has figured prominently in almost every important new development in graphite electrode manufacture. Continuing research . . . a skilled technical staff and modern, well-equipped laboratories, enables International to recommend new ways to solve your particular electrode problems. Competent sales and service engineers are prepared to help you in the selection and use of International products or to apply International's long experience to your ideas in fostering new developments with graphite.

This *plus* service is a good reason to look to International when you need the best graphite electrodes money can buy, or technical help in using them.

Graphite products for electrothermic and electrolytic applications

IGE *International* GRAPHITE AND ELECTRODE CORP.

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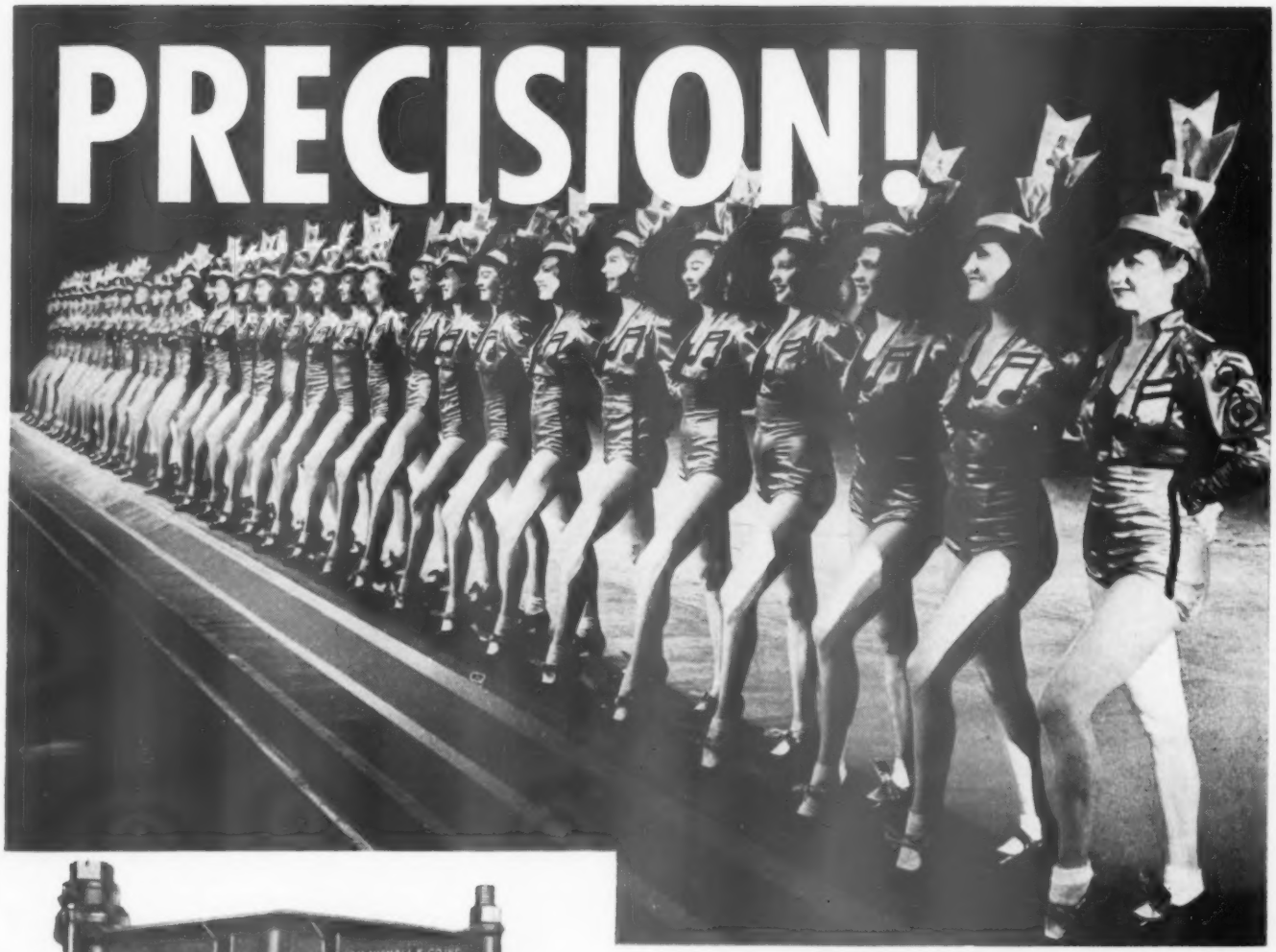
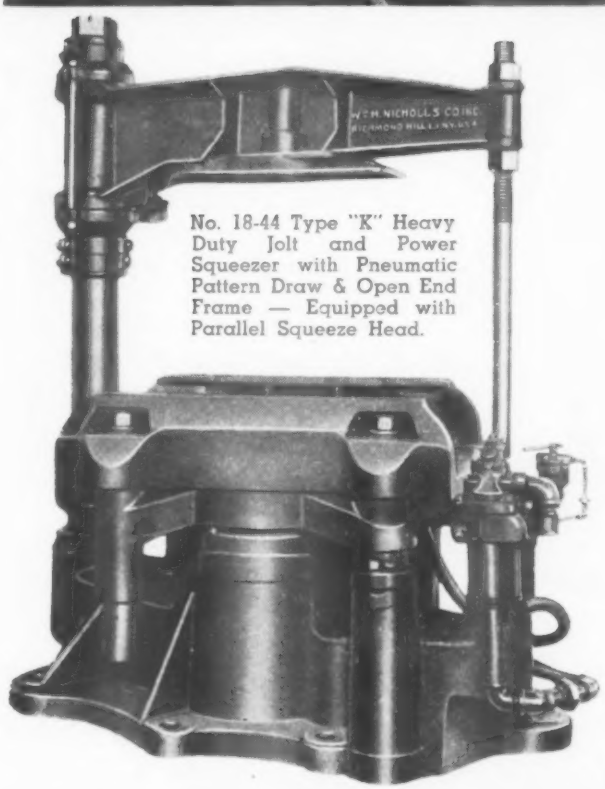
PRECISION!



World Famous Radio City Music Hall "Rockettes"



No. 18-44 Type "K" Heavy Duty Jolt and Power Squeezer with Pneumatic Pattern Draw & Open End Frame — Equipped with Parallel Squeeze Head.

Double PRECISION! That's what you get with Nicholls Molding Machines. Each Nicholls Molding Machine is itself PRECISION built, making it possible to turn out PRECISION molds in endless quantities. The exactness in time and material results in substantial savings to you. Naturally Nicholls has a complete line of stationary and portable types for the production of light, medium and heavy castings, all of which can be furnished with electric controls for push button operation.

Wm. H. NICHOLLS Co., Inc.

RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

FOREIGN MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EUROPE AND GREAT BRITAIN—GEORGE FISCHER, LTD., SCHAFFHAUSEN, SWITZERLAND.

NICHOLLS

Controlled Uniformity of SMITH L-O CORE OIL Produces Quality Castings

Your production flow of core-making and casting is speeded up with Smith L-O Core Oil on the job. Cores bind tenaciously for strength, durability, and uniformity... both thin and thick sections dry rapidly and evenly...positive collapsibility makes the shake-out a cleaner, quicker operation. All this, plus many other features which lead to an appreciable improvement in the quality of your castings.

Take advantage of this combination of factors and increase productivity and profits. Get Smith L-O Core Oil for your core room. It is available in 20 grades to suit your needs. It is Dow-Therm processed to assure controlled-uniformity shipment after shipment.

Consult our representative in your territory. He is a practical foundryman who may prove to be helpful when difficult problems arise.

Smith L-O Core Oil

WAREHOUSE STOCKS AVAILABLE
In The Following Cities

- COLUMBIAN WAREHOUSE CO. — Reading, Pennsylvania
- FOUNDRY SERVICE CO. — Birmingham, Alabama
- E. R. FROST CO. — Minneapolis, Minnesota
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CORE WASH ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO
MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
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ROTO-CLONE is an exclusive product of American Air Filter Company, Inc., Louisville, Kentucky, representing a complete line of dust collector designs widely used in every dust-producing industry.

STOCKHAM VALVES & FITTINGS
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THE CHICAGO FAUCET CO.

Proudly we Serve

MANY OF AMERICA'S MOST EFFICIENT FOUNDRIES

The best testimony of the worthiness of Ransohoff Wet Method Automatic Star Return casting and Sprue Cleaning Mills and related equipment are names of some foundries wherein Ransohoff equipment is now "at work".

Our new, informative casting cleaning brochure is now ready for distribution and a copy is yours — upon request.

N. RANSOHOFF, INC.

Equipment for the Surface Treatment of Metal

Township and Big Four **Cincinnati 16, Ohio**

WM. E. PRATT MFG. CO.
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PERFECT CIRCLE CORP.
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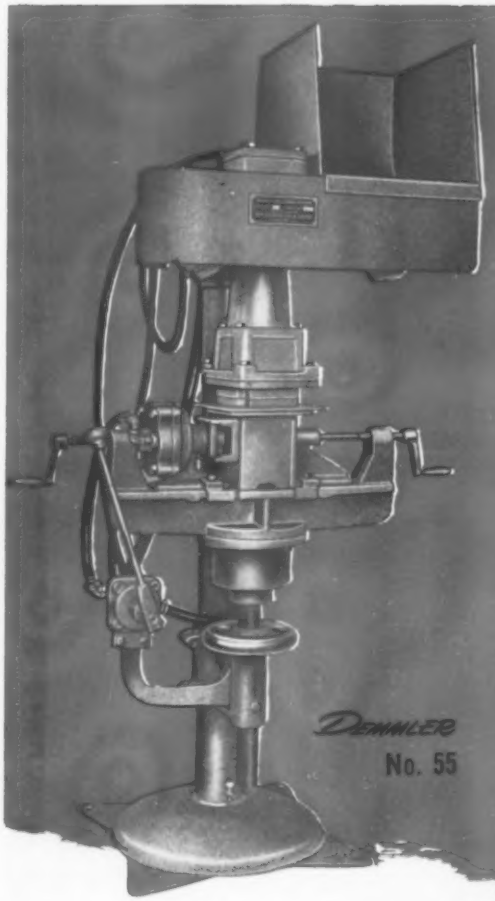
INTERNATIONAL HARVESTER CO. OF CANADA, LTD.
Hamilton, Ontario

THE FANNER MANUFACTURING CO.
Cleveland, Ohio

INCREASE PRODUCTION FOR GREATER PROFITS WITH DEMMLER CORE BLOWERS



Today's high manufacturing costs and stiff competition make high production at low cost an absolute necessity.

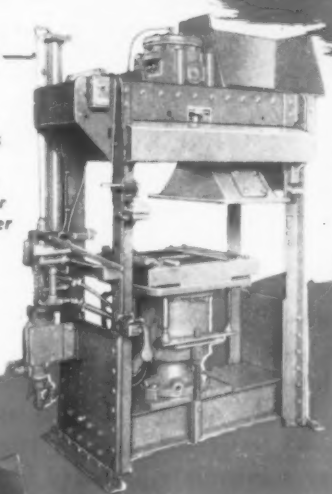
That's why scores of foundries have recently added Demmler core-blowers or replaced their less efficient machines with Demmlers. You, too, can increase your profit margin with Demmler machines. Available in a wide variety of sizes to meet every need, Demmler core-blowers represent an outstanding investment — an investment in greater profits for you!

DEMMLER NO. 55

If your foundry blows small cores, you'll find the DEMMLER NO. 55 a real producer. Complete cycle takes only about three seconds! Newest addition to the long famous DEMMLER line, it has already earned the praise of foundrymen everywhere. The No. 55 will blow cores weighing up to four pounds, will accommodate boxes nine inches long. Machine has both vertical and horizontal air operated core box clamps, automatically controlled by the same valve that blows the core. Simple in construction and operation, the DEMMLER NO. 55 is ideal for short run jobs — a proven money maker! You can't afford to be without this machine.

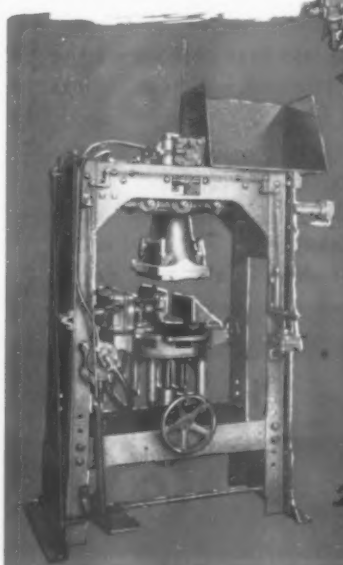
let us help—

You may already own one or more DEMMLER core blowers — or none at all — but in any event we may be able to suggest better applications for increased production — higher profits. Tell us about your core blowing problems; we'll be happy to help you!



DEMMLER NO. 2E

The No. 2E core blower is designed for use on cores which can be blown to advantage by attaching the top half of the core box to the blow plate and drawing the core on the machine. The cylinder has a long center guide item which slides in a sleeve to insure a draw of extreme accuracy. Two hand valves are used to operate the machine. One moves the carriage from filling to blowing position, and the other raises the table, blows the core, and draws the core. The time of the cycle is about 12 seconds. Sand magazines available to suit customer's requirements.



DEMMLER NO. 1

General purpose machine! The DEMMLER NO. 1 needs no introduction being one of the best known — and liked — core machines in the field. Will blow cores weighing up to eight lbs.

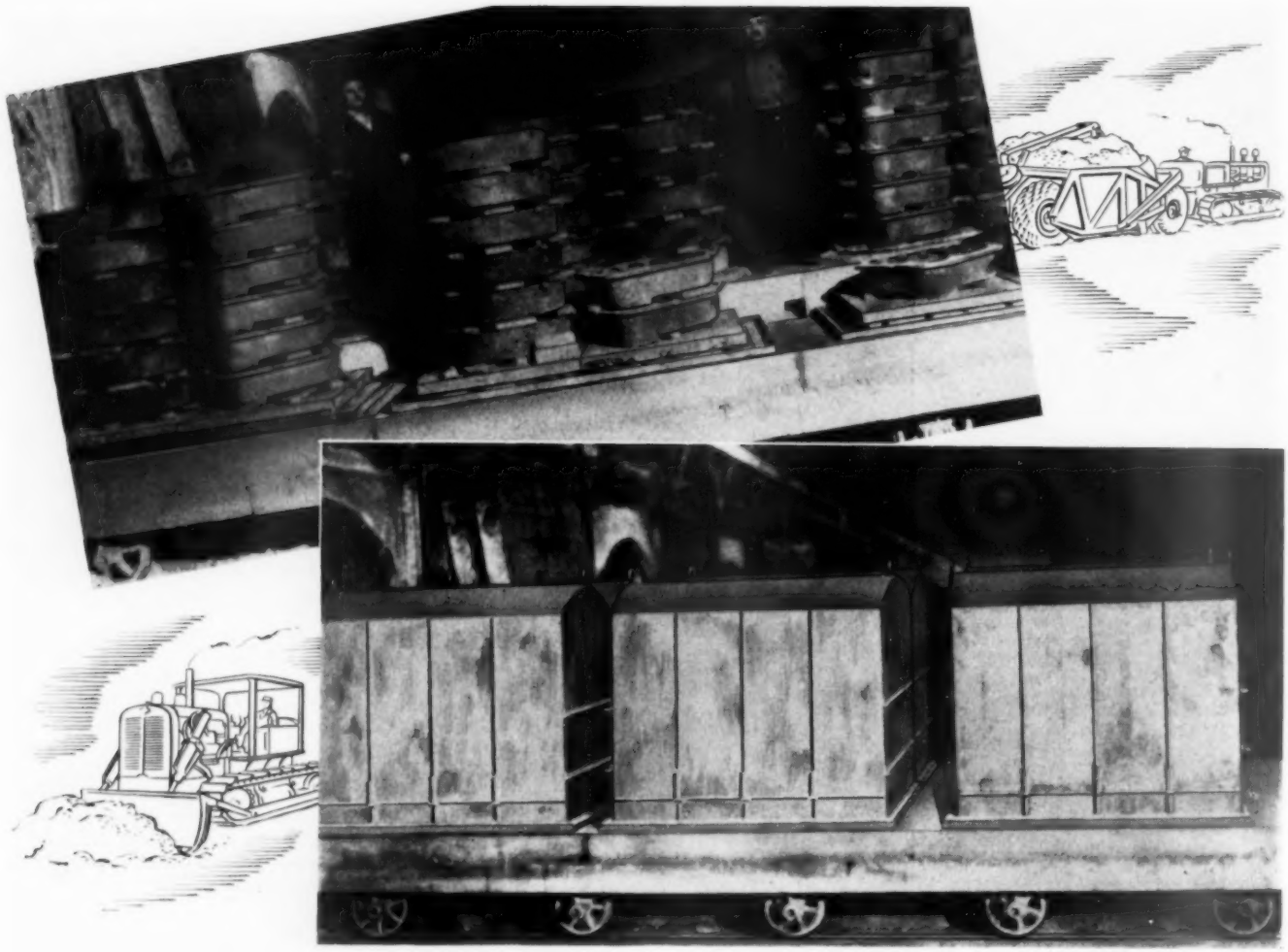
The DEMMLER NO. 1 possesses quick job changing features. Chuck table is raised and lowered by a hand wheel. Chuck jaws are easily adjusted for different core box widths. Different size sand magazines are available. High capacity. Many of these machines have been in continuous, profitable use for more than 25 years with only minor repairs!

Illustrated specification sheets on any of the three illustrated machines will be sent on request

Wm. DEMMLER & BROS.

Kewanee, Illinois

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911



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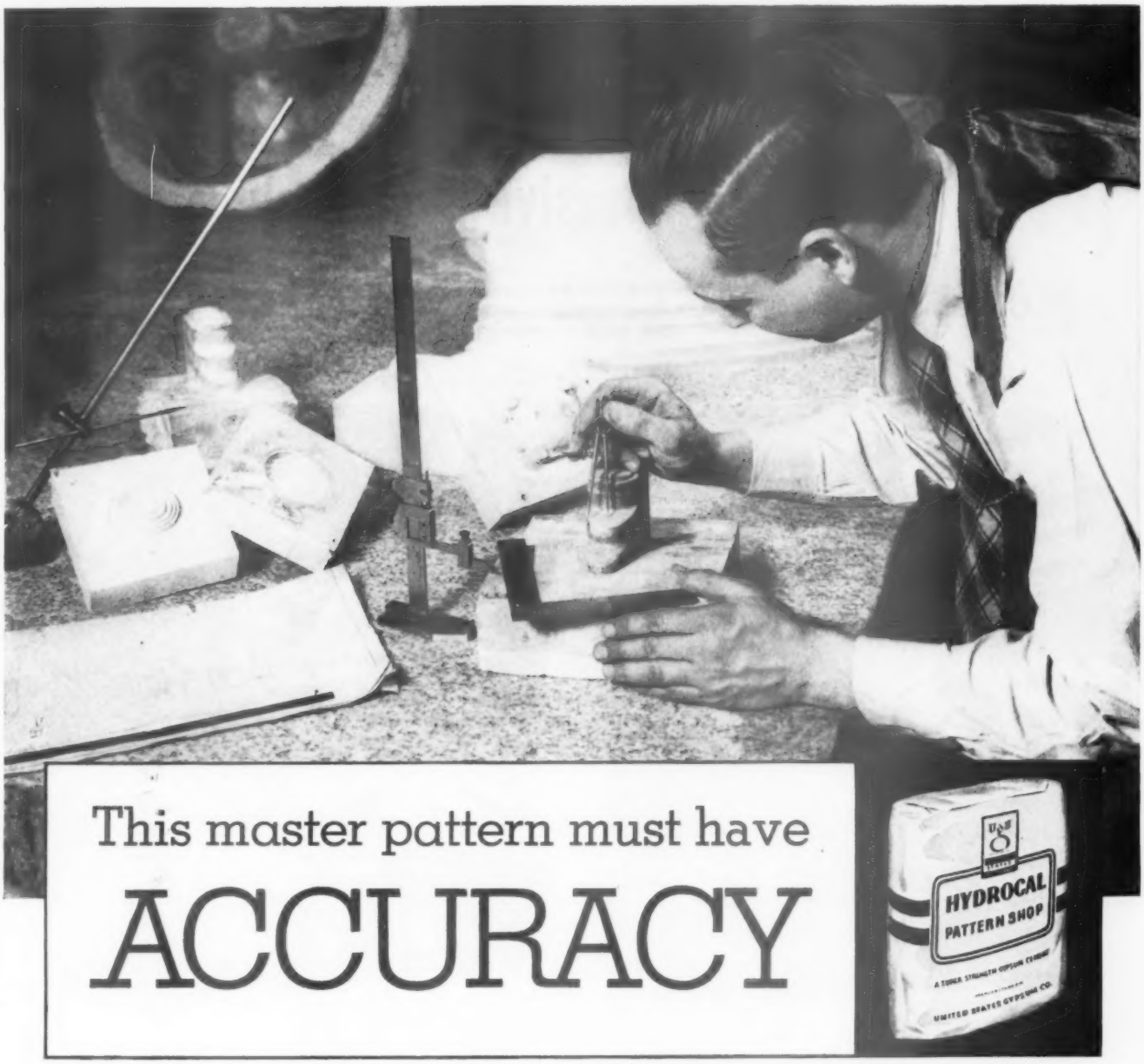

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A note on Abrasives

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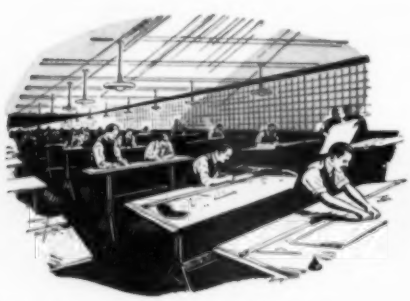

The only complete line of Abrasive Tools is

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Engineering News
ON ABRASIVE PRODUCTS

Belt Backstand Idler Techniques Effect Operating Cost Reduction

Substantially increased output, lower unit costs and improved finishes are influencing more metal working plants to switch to belt backstand idlers for grinding and finishing flat and contoured surfaces of both small and medium weight pieces. In many factories where set-up wheels were formerly used, conversion from 25 to 100% to the backstand technique has been effected. While these methods normally involve grinding speeds of 6500 to 7000 SFPM with glue-bonded abrasive cloth belts, speeds of 10,000 SFPM are being used widely today with resin bonded belts.

As a result of recent wide-spread experiences with belt backstand idler techniques, our trained staff of engineers is equipped to guide users in making the best use of this equipment. In all cases they are able to recommend applications and abrasive materials to meet your requirements.

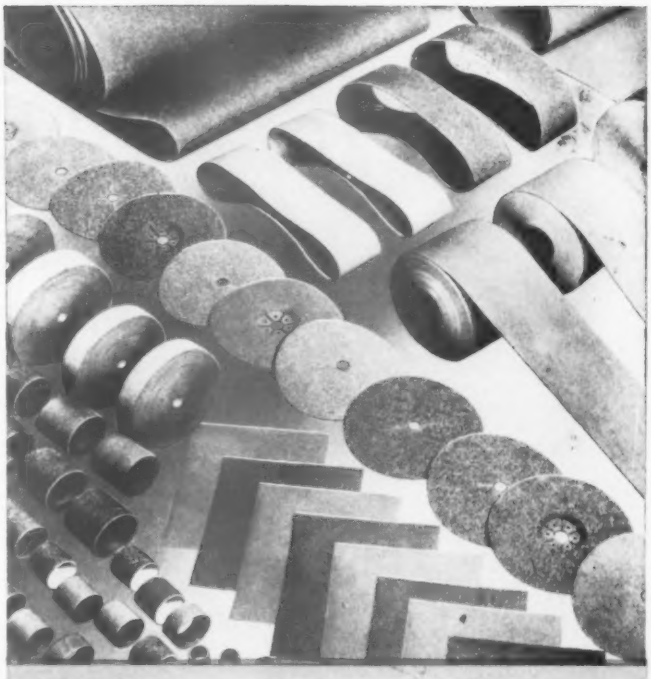
Better Work with Cylindrical and Crankshaft Grinding

Cylindrical grinding wheels including crankshaft wheels by CARBORUNDUM are engineered to provide the tools required for maintenance of efficient production rates, rapid stock removal and fine surface finish.

V11 bond represents the most recent contribution to this class of grinding. These wheels are designed with a *specific structural balance* which when combined with the proper grain size and abrasive type offers the following advantages to both operator and management:

1. Cool and free cutting characteristics promote more efficient production of superior finishes and close tolerances. This is of great importance in operations involving both OD and shoulder or face grinding.
2. Designed structural balance permits continuous fast cutting rates which promote high production.
3. Fast cutting qualities combined with long life save dollars in operator and machine time as well as abrasive costs.
4. Engineered uniformity of the abrasive and bond components of these wheels permits close control of part size and form.
5. Self dressing characteristics provide longer periods of use between dressings . . . save dressing time, usable abrasive and dressing tools.
6. Ability to grind a wide range of materials makes possible savings in inventories of special wheels and minimizes requirements for premium priced abrasives.
7. Savings in set-up time are made possible because the versatility of V11 bond wheels permits efficient grinding of many varieties of work, making it unnecessary to change wheels when changing from one job to another.

For prompt attention to abrasive problems, call your nearest branch office of The Carborundum Company.



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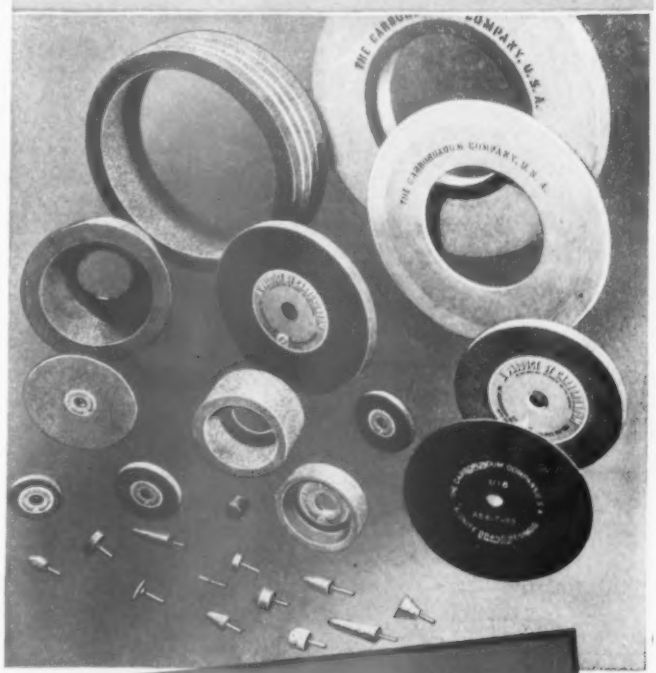

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Continued FEF Support Is a Sound Investment

FIVE years ago a small group of far-seeing foundrymen met and discussed the need for doing a better job of foundry education. Enthusiasm of these men of vision was so great that, before long, the trade and technical associations appointed representatives to a Joint Foundry Educational Committee. This committee held many meetings, studied foundry educational work then being carried on by the various organized groups, discussed many suggestions as to what should be done, and finally developed a plan which was approved by the Boards of Directors of the American Foundrymen's Society, the Gray Iron Founders' Society and the Malleable Founders' Society. As the plan unfolded, the Foundry Educational Foundation was established. A fund-raising campaign, financed with $5000 contributed jointly by the gray iron and malleable societies, raised over $300,000 for a three-year program. Success of the FEF and the influence of its work on the foundry industry now is a matter of history.

The initial program of the foundation brought affiliation with five important engineering schools, provided funds to help equip the foundry laboratories in those institutions, established scholarships totaling approximately $155,000 for undergraduates specializing in foundry courses, and assisted the first graduate students in foundry practice in the history of the industry. Although the Foundation has been functioning less than three years, the industry already is securing engineering graduates who have taken special courses in foundry and related subjects, and are sold on the job possibilities offered by foundries. Preliminary reports of 1949 engineering graduates show that 16 scholarship graduates and 22 nonscholarship graduates from the present seven FEF affiliated colleges, and 29 from other engineering schools took jobs in foundries. During the summer 129 engineering undergraduates were employed by foundries.

While this is a gratifying record of accomplishment in a relatively short period of time, the intangible results also will have far-reaching benefits for the foundry industry. FEF activities in the field of education have developed a greater interest in the foundry industry and its products on the part of practically every engineering school in the country. More undergraduate students now are given courses in foundry practice, and much greater attention is being given to studying the value of castings as basic engineering materials.

Work of the FEF in providing an adequate supply of selected engineers for the industry, and in stimulating the dissemination of information on properties and applications of castings among young engineers must continue. In the long run, every foundry producing quality castings will benefit. In order that the Foundation may continue the work now under way, and enlarge the program to include five additional universities, every foundry should contribute liberally to the fund-raising campaign which starts this month.

This is a sound investment in the future progress of the foundry industry.

Frank G. Steinebach
Editor

THE FOUNDRY—WHEREVER METALS ARE CAST

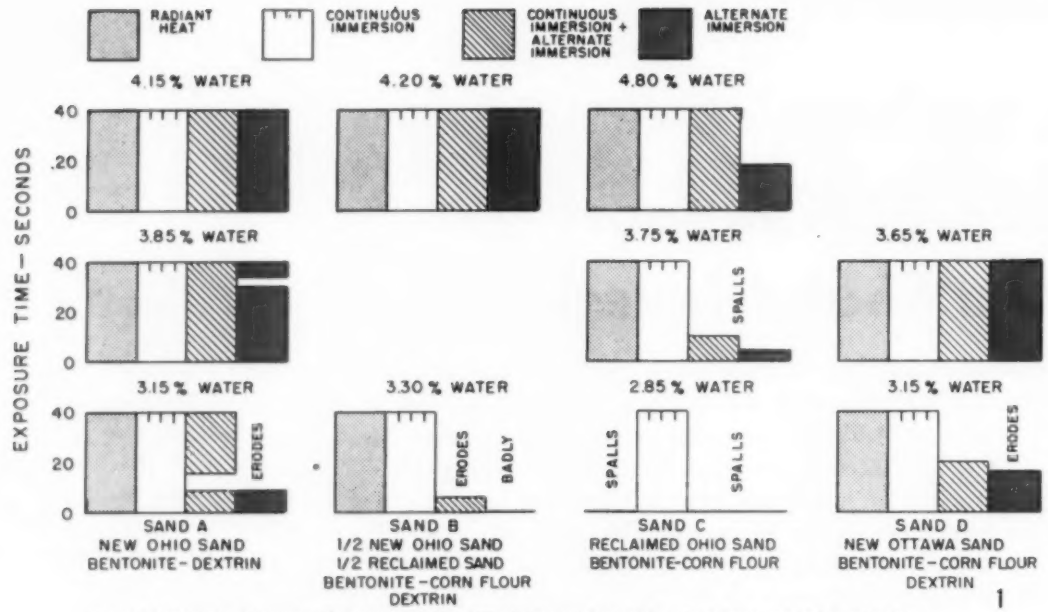
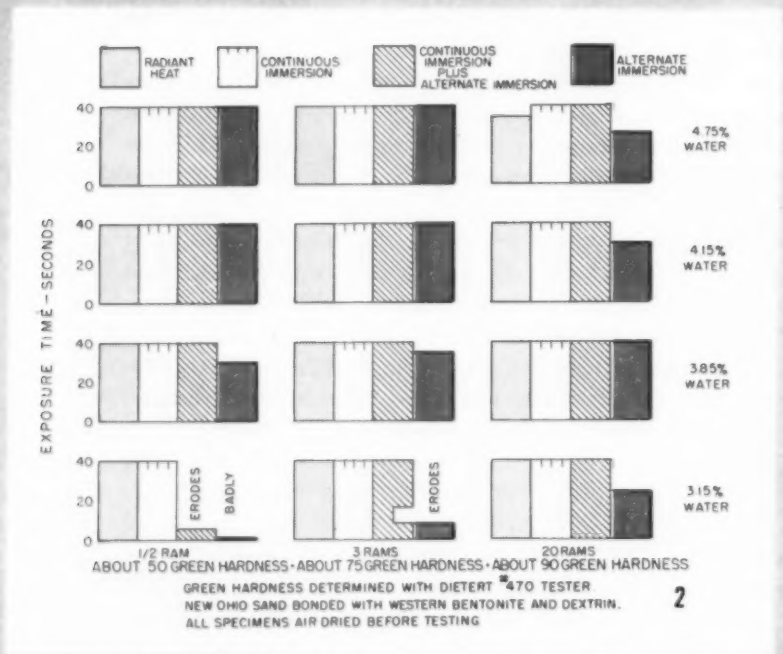


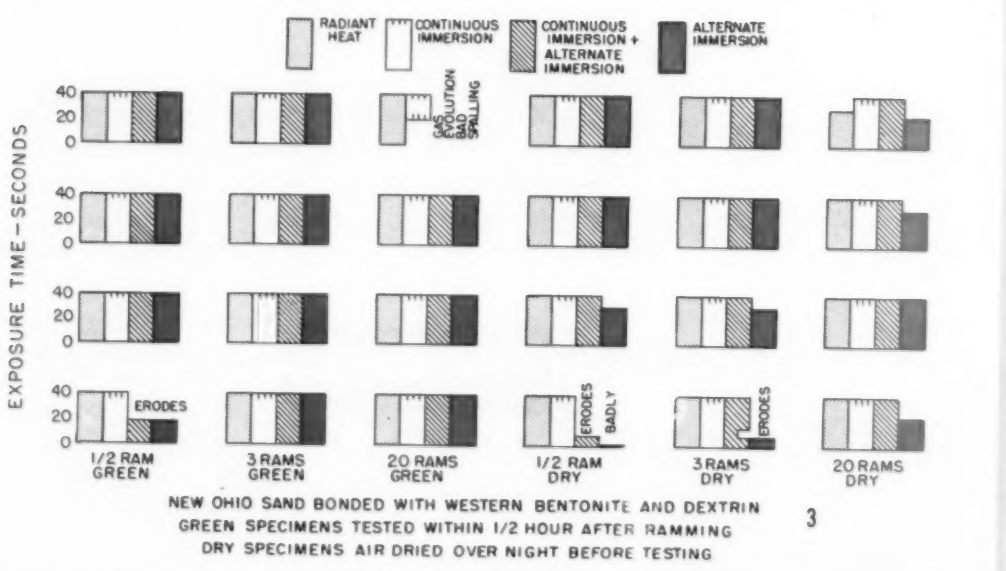
Fig. 1—Effect of water content on sand behavior during various forms of exposure to liquid metal

Fig. 2—Showing how behavior of a sand can vary if ramming level as well as water content are not under control



SAND IN THE
VS.
SAND IN THE

Fig. 3 — Comparison between behavior of sand illustrated in Fig. 2 when tested green and that of same sand after air drying



Effective control of certain variables in molding sand use is the most important problem facing the foundry industry today, according to the author. These variables, the effects of which are demonstrated in studies described here, include moisture evaporation during sand handling, ramming, evaporation after ramming, mold finishing and washing

...E MILL

...E MOLD

By J. B. CAINE
Metallurgist
Sawbrook Steel Castings Co.
Lockland, O.

DOESN'T anyone worry about what is happening to his sand from the time it is mulled or conditioned until the mold is rammed, finished, closed up and poured? From the literature on foundry sand it would appear that all foundries pour metal against their sand as it is being discharged from the mill, for the subject of what happens between discharge and mold pouring seems to have been ignored in all the reams that have been written. Nevertheless, until molds are made on automatic machines the moment the sand is discharged from the mill, changes occurring in the sand as it is being handled to and by the molder cannot be ignored.

These changes must be studied and controlled. Admittedly, such a study is difficult, control even more difficult; but it must be done. The whole foundry industry today is fooling itself in believing that its sand properties as determined from samples obtained at the mill are the properties of the sand forming the castings it is selling.

Is anyone doing anything about evaporation during handling and molding, other than being sure the sand sample for testing is taken below the surface so that the sample is "representative"? How about effective control of ramming, finishing, nailing, washing, drying? Any of these variables will affect the behavior of the sand during those all-important seconds when it is forming the casting—and to a greater degree than will minor variations in the sand at the mill. In many instances these foundry operations, if not performed correctly, will overshadow gross variations in mulling or conditioning procedure and in raw materials.

The author has studied these variables in an attempt to determine the relative importance of those practices which might influence the behavior of steel molding sand when it is in contact with liquid steel, from the time the sand leaves the muller or conditioner until the mold is rammed, closed and poured, presuming that the sand has been checked and found satisfactory at the mill.

The procedure used consisted of contacting standard AFS 2-in. diam x 2 in. specimens with molten steel and observing the behavior of the sand under conditions simulating those prevailing when the mold is poured and the sand is in contact with liquid metal. Space does not permit a detailed description of the procedures, but they have been published previously as Part I of this study (THE FOUNDRY Vol. 75 No. 7 July 1947). Briefly, the test consists of inserting a nut with small brads welded to it, acting as arbors, into the standard AFS test specimen when it is rammed. The sand specimen can then be screwed onto a rod and can be contacted by molten metal in any way to simulate conditions prevailing in the mold.

Five tests have been selected that seem to be the most informative:

1. Exposure to radiant heat by holding the sand specimen about ½-in. above the surface of slag-free molten metal. This test simulates the conditions prevailing at the cope surface of the mold as the mold is being filled.

2. Exposure to radiant heat as in Test 1, plus immersion in molten metal. This test simulates conditions prevailing when molten metal comes in contact with the cope mold surface after it has been exposed to radiant heat.

3. Continuous immersion (stationary metal). The standard AFS test specimen is immersed in slag-free molten metal to a depth of about 1¾ in. and withdrawn at stated time intervals for visual examination. A new specimen is used for each time interval. This test simulates conditions in the mold when the sand is in contact with stationary metal at locations where little or no metal flows over the sand.

4. Alternate immersion (flowing metal). The test specimen is alternately immersed and withdrawn from molten metal. This test simulates conditions prevailing at the mold surface as the metal first enters the mold, at the surfaces of gates, or any location where the metal flow over the sand is discontinuous.

5. Continuous immersion for a short time (2 seconds) followed by alternate immersion. There is a great difference in the behavior of sand if a glaze is formed on the surface in contact with molten metal. Test 4 is much more severe than Test 5. If the sand under investigation glazes when in contact with molten metal, both tests are necessary to properly evaluate its behavior when in contact with moving metal.

The first four tests are applicable to any metal, and the defects found on visual examination of the specimens are similar to the type of sand defects found on the surface of all types of metal castings. Test 5 may or may not be applicable to all metals,

for it measures the effect of glaze formation. This test is quite applicable to steel, for all steel sands, with the exception of clay-free core sands, form a glaze when in contact with molten steel. This test may not be applicable to metals of lower melting points if they do not glaze the sand on contact. In such cases, Test 5 should not be used, but Test 4 will be applicable.

Buckles, scabs, cope spalls and erosion are all encountered in the tests, as were illustrated and discussed in detail in the writer's previous article in THE FOUNDRY. It was also found that sands prone to these defects in production exhibited the same defects in the tests within the time interval expected. An additional year's experience with the test has confirmed the writer's original findings. Many seeming discrepancies between the behavior of a sand in the test and in production can be traced to mass effect. This is particularly true of the behavior when exposed to radiant heat, as a measure of cope spalling. This is to be expected, for stresses set up in the 3 sq in. surface of the test specimen when exposed to radiant heat will not be nearly as great, nor exceed the rupture strength of the sand nearly as fast, as in a 60-in. diameter flat cope surface with a surface area of over 2800 sq in.

The dip test then seems a good one for preliminary screening of sands and methods, if for no other reason than that it is fast. If the sand being tested does not perform satisfactorily under these dip tests, within the time interval corresponding to the time required to fill the mold and while the sand is in contact with molten metal, it is almost certain that the particular sand will not perform satisfactorily in production. However, the fact that the sand does perform satisfactorily in the test does not guarantee perfect performance in production, if only because of the effect of mass described in the preceding paragraph.

It would be nice if any test on any material could be developed that would tell everything, especially the effect of mass, but such a test just isn't in the cards. Until such a utopian test is developed, the only known procedure for the next step is to make castings, not just one or two, but hundreds, not just one size or type, but many kinds. This means putting the sand in production.

This second step is time consuming and expensive, especially if the sand does not perform satisfactorily. The advantage of a preliminary test, such as the dip test for a fast preliminary screening test, is self evident. Speed of the test enables the investigator to study the effect of extremes and establish limits, an essential point if the succeeding tests are to be carried out in semiproduction, as they must be, at least for the present.

So much for the test itself, but just a word about the method of presenting the results. As there is only one numerical variable in the test—time—ordinary graphs cannot be used. A method is required in which the visual behavior of the sand under test can be illustrated against (*Please turn to page* 232)

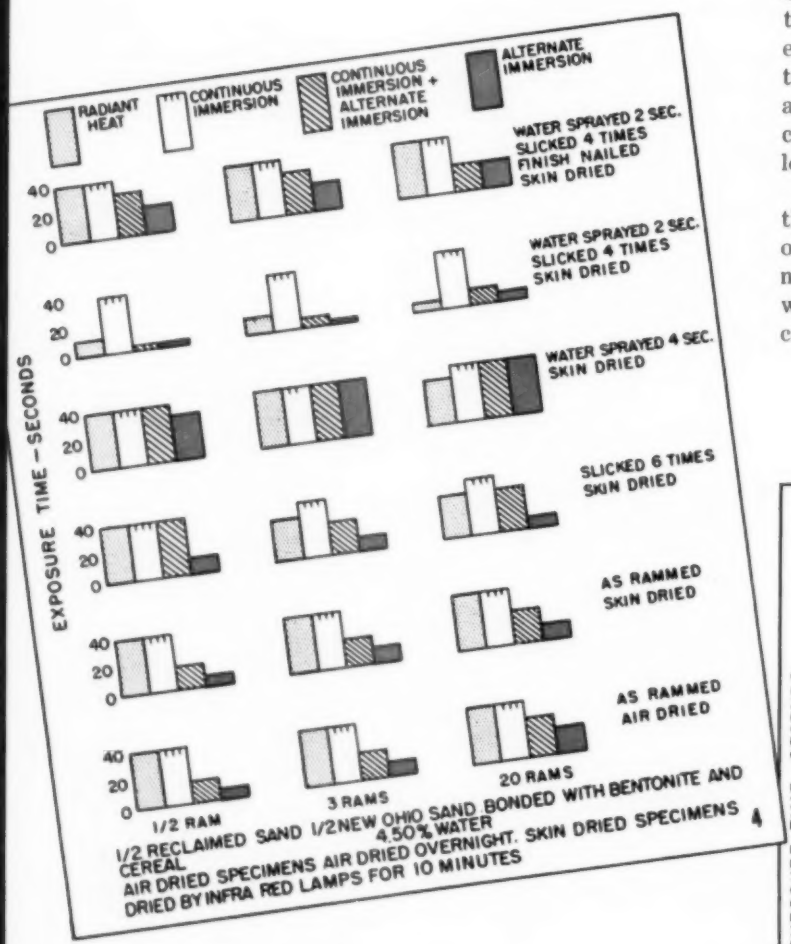

RADIANT HEAT
CONTINUOUS IMMERSION
CONTINUOUS IMMERSION + ALTERNATE IMMERSION
ALTERNATE IMMERSION
WATER SPRAYED 2 SEC. SLICKED 4 TIMES FINISH NAILED SKIN DRIED
WATER SPRAYED 2 SEC. SLICKED 4 TIMES SKIN DRIED
WATER SPRAYED 4 SEC. SKIN DRIED
SLICKED 6 TIMES SKIN DRIED
AS RAMMED SKIN DRIED
AS RAMMED AIR DRIED
EXPOSURE TIME—SECONDS
40
20
0
1/2 RAM
3 RAMS
20 RAMS
1/2 RECLAIMED SAND 1/2 NEW OHIO SAND BONDED WITH BENTONITE AND CEREAL
4.50% WATER
AIR DRIED SPECIMENS AIR DRIED OVERNIGHT. SKIN DRIED SPECIMENS DRIED BY INFRA RED LAMPS FOR 10 MINUTES

Fig. 4—Illustrating the effect of finishing procedures.

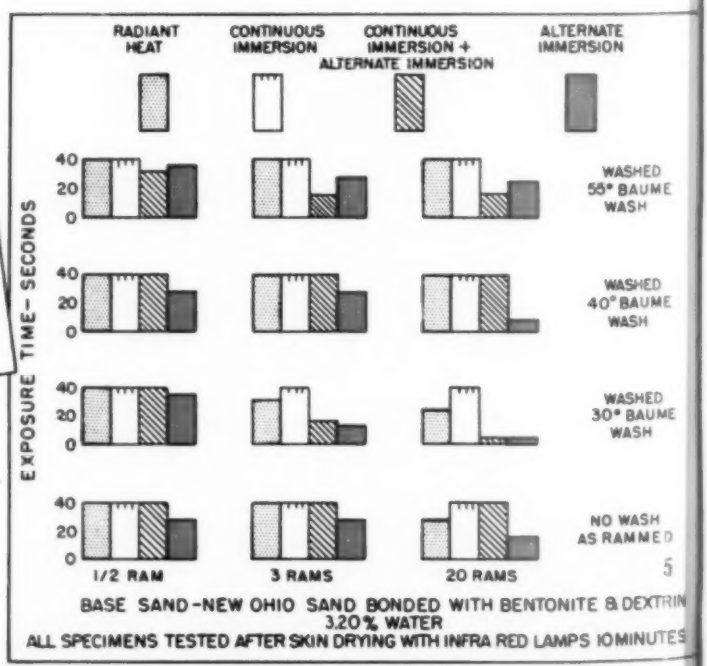


Fig. 5—Showing how density of wash influences sand behavior

FOUNDRIES — PAST AND PRESENT

This resume of the transition from manual to mechanical operations in the foundry industry comprises an address presented by the author before the 1949 annual meeting of the Franklin Institute in Philadelphia

By WILLIAM H. WORRILOW
President
Lebanon Steel Foundry
Lebanon, Pa.

THE accurate story of casting metals is lost in the mists of antiquity. Our best authenticated records show it to have begun in Mesopotamia where warlike tribes were the first peoples to use metals cast to form. This was approximately 4000 B.C. Gold was the first metal that was given form by human hands but this was done by hammering. The first castings were of bronze.

From Mesopotamia the art spread eastward to India and China. The Bronze Age reached its highest development in China during the Shang dynasty, about 1500 B.C. Chinese founders specialized in casting huge images in bronze.

Iron casting was begun in China during the eighth century before Christ. The earliest sand mold has been traced to 645 B. C. in China; prior to that stone molds and various other crude methods were used to give form to the objects made. From China the knowledge of casting spread to Japan where the records of casting date from 1000 B.C.

The Hindus developed cast steel; this was a type of blister steel, produced in a crucible. The date of this development is five hundred years after Christ, approximately the same time that Europe was reverting to the near-savagery of the Dark Ages. The processes by which the Hindus made steel were never revealed to the West since the Eastern world shut itself off in the tenth century after Christ. It was not until the eighteenth century that Benjamin Huntsman, in England, perfected the process of making crucible steel.

The Western world of antiquity embraced the eastern shores of the Mediterranean Sea. Palestine and Egypt were aware of the metal casting arts as early as 2800 B.C. At the time of the building of Solomon's Temple a contract was given to Hiram Abith, the Chief Artisan of Hiram, King of Tyre, a city in the country now known as Lebanon. This Hiram was "skillful to work in gold, and in silver, in brass and in iron." To learn more of his accomplishments refer to the 7th Chapter of First Kings in the Bible and read of the marvelous castings he made in brass. I doubt whether, to this day, they have been excelled.

The foundry in which the castings were made was in the valley of Succoth, as the size and weight of the castings precluded the use of the ordinary foundry building of that day.

We assume that Hiram was an educated slave of exceptional mentality and engineering skill, and that all of the men employed by him were also slaves, varying in ability, as do workmen today. In those days wages were never a problem and a whip was the incentive to good work and production.

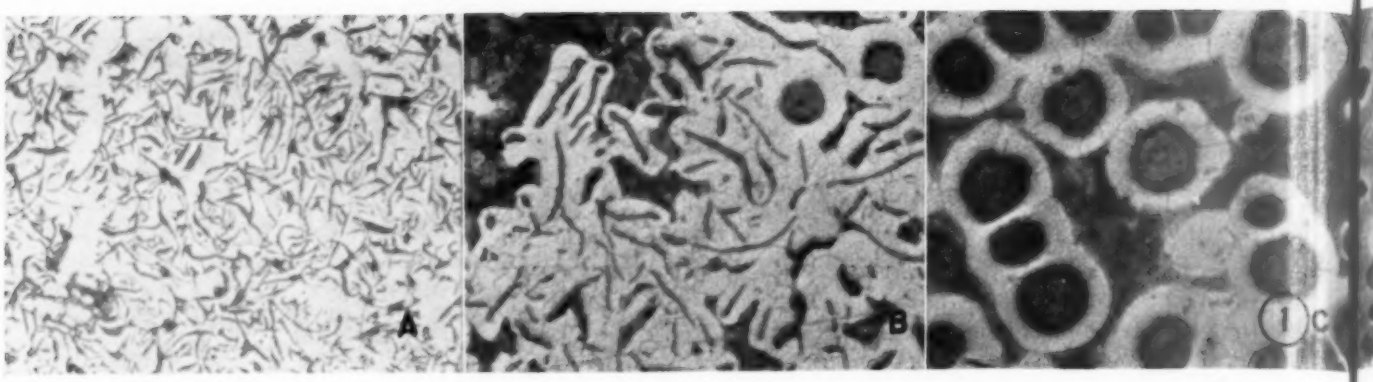
From the times of the Old Testament we move to that of St. Paul and I should like to quote a few passages from the book "The Apostle" by Sholem Asch in which he describes the celebrated bronze foundries of Corinth at the time of St. Paul or about 100 A.D.

Corinth was known for her bronze foundries. They had the secret of producing various alloys in perfect proportions; their slaves also had a special skill in imparting to bronze a patina suggesting great age, while at the same time the metal acquired a peculiar bell-like timbre. Corinthian bronze was valued above all other metals in the ancient world—not excluding gold. The workers in Corinth were trained in their special skill from earliest childhood, for only those long accustomed to it could endure the heat of the furnaces and could work the metal as it was poured into its molds.

The melting furnaces were in deep caverns hollowed out of rocks. At the farthest end was the furnace itself, and close to the furnace was the section set aside as the dwelling place of the slaves. They never issued into the light of day; their food was let down to them at the end of a rope. When one of the slaves died, his body was cast into the flames. Not human beings but moles they were, leading from childhood a subterranean life; moles of a special kind, able to endure the constant heat of the caverns to move, labor, produce in the midst of the heat of a furnace, to pass from chamber to chamber, one hotter than the other, and to draw the fiery air into their lungs. A hot vapor forever clung to their bodies. Face, chest, shoulders, hands were pitted and marked with innumerable scars—the result of the ceaseless torrents of metallic sparks.

The skilled slaves of the foundry mixed the various metals in proper proportions. These craftsmen were treated better than the furnace slaves and because of their value were more closely watched, as the loss of one was a serious matter and they might also impart the secret of the craft to outsiders. So even these slaves were never permitted to leave the caverns, and they were chained to their beds.

After the castings were (*Please turn to page* 206)



NEW Graphite

Experimental results in use of an iron-silicon-magnesium alloy to produce nodular graphite in cast iron are described here. Among the advantages indicated for this alloy is the elimination of the necessity for a separate inoculating treatment following the nodulizing addition

By E. T. MYSKOWSKI and R. P. DUNPHY
Naval Research Laboratory
Navy Department
Washington

CONSIDERABLE attention has been focussed recently on the development of nodular cast iron. The work reported by Morrogh and Williams[1] showed a practical but expensive method of producing nodular graphite in low-sulphur hypereutectic cast iron by the addition of cerium to the molten metal. A later report by Gagnebin et al[2] indicated that magnesium could also be used to nodulize graphite. While from an economic standpoint the use of magnesium is advantageous, there are certain inherent dangers and undesirable features in the magnesium process as described which made it desirable to develop a safer alloy and process.

The more recent comprehensive work by Donoho showed that the addition of metallic magnesium per se is recognized as a dangerous procedure because of the explosive reactivity of magnesium with molten cast iron. The recovery of magnesium resulting from direct additions to molten cast iron is reported as being very low. Nickel-magnesium and copper-magnesium alloys containing about 20 per cent magnesium have been used with success in the production of nodular cast iron. However, the presence of nickel or copper in increasing amounts in the recirculating scrap poses a serious problem when these elements build up beyond relatively low levels. The use of these alloys also entails a subsequent inoculation treatment with standard graphitizing inoculants in order to develop optimum microstructures and mechanical properties in the iron.[3]

An alloy containing approximately 8 per cent magnesium in a 50 per cent ferrosilicon carrier was evolved at the Naval Research Laboratory in the course of an investigation on the use of magnesium in the deoxidation of cast steel. Ferrosilicon was selected as a carrier because of its compatibility with magnesium at high temperatures and because an alloy of this type would not introduce undesirable elements into the steel.

When it became generally known that magnesium could be used to nodulize the graphite in cast iron, the Fe-Si-Mg alloy was introduced into molten cast iron with immediate success. All test heats were induction melted in a magnesia-lined furnace and superheated to 2650°F for tapping. The iron was tapped into a preheated clay-graphite crucible on the bottom of which was spread the Fe-Si-Mg alloy. Most of the heats were made of Armco iron with Mexican graphite and 50 per cent ferrosilicon added in sufficient quantities to produce the desired compositions. A few heats were made of steel scrap base and the rest were made of commercial pig.

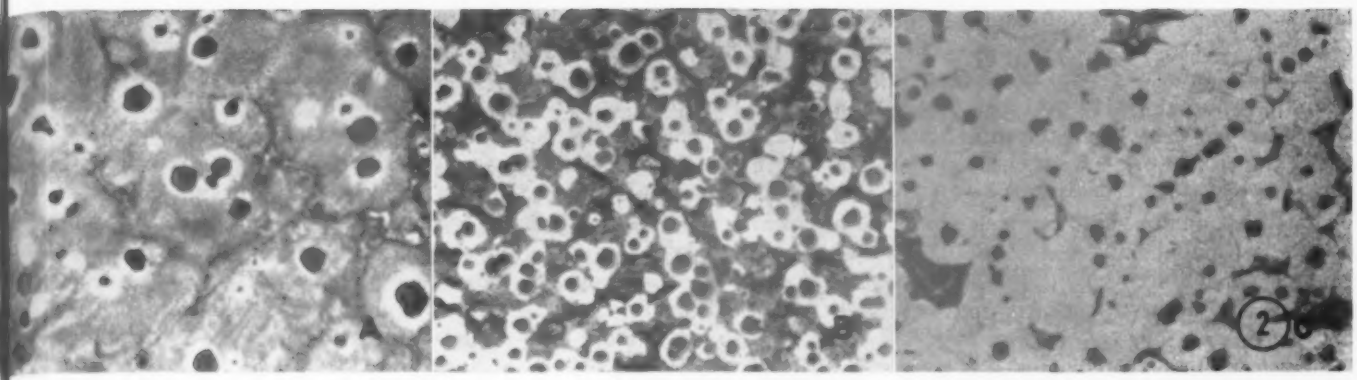


Fig. 1—Effect of magnesium on cast iron (A) Silicon, 2.51 per cent, carbon 3.66, manganese 0.45, sulphur 0.03 (original) 0.029 final, magnesium 0.03 (added) 0.01 (final). (B) Silicon 2.59 per cent, carbon 3.54, manganese 0.44, sulphur 0.03 (original) 0.028 final, magnesium 0.08 (added) 0.05 (final). (C) Silicon 2.52 per cent, carbon 3.31, manganese 0.44, sulphur 0.03 (original) 0.024 (final), magnesium 0.12 (added) 0.11 (final). X100

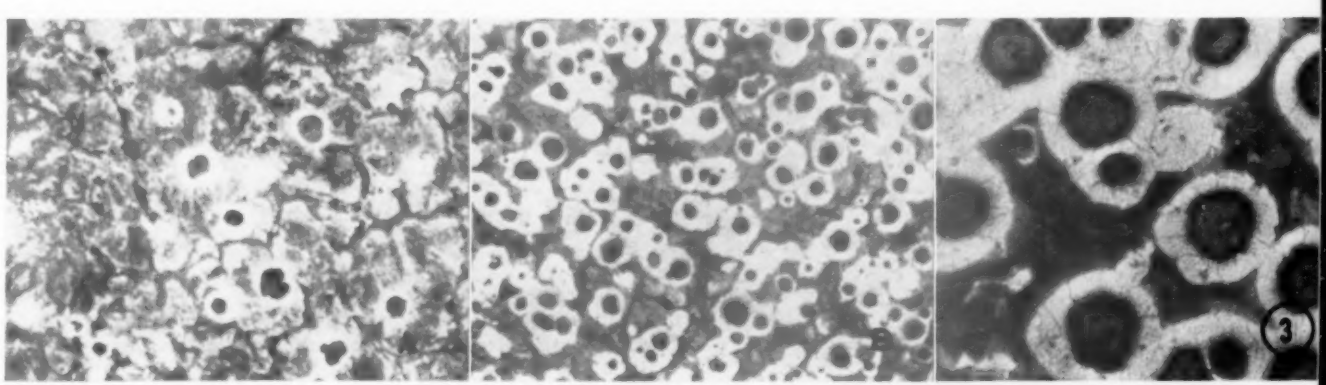
e Nodulizing ALLOY

Developed by Naval Research Laboratory

Fig. 2—Effect of silicon on nodulation of graphite. (A) Silicon 1.61 per cent, carbon 3.51, manganese 0.46, sulphur 0.10 (original) 0.034 (final) magnesium 0.24 (added) 0.09 (final). (B) Silicon 2.29 per cent, carbon 2.68, manganese 0.54, sulphur 0.03 (original) 0.023 (final) magnesium 0.12 (added) 0.07 (final). (C) Silicon 3.83 per cent, carbon 2.47, manganese 0.47, sulphur 0.03 (original) 0.024 (final) magnesium 0.12 (added) 0.09 (final). X100

The initial heats were treated with a Fe-Si-Mg alloy prepared from a low aluminum ferrosilicon base. Subsequent heats were inoculated with an alloy prepared in a regular grade ferrosilicon base which contains approximately 2 per cent aluminum. The reaction between the molten metal and the Mg alloy was quiet with only a moderate amount of flare and no ejection of metal from the crucible. The treated iron was poured shortly after the magnesium addition. Holding power tests of the treated metal held in a crucible in a gas-fired furnace indicated no loss of

Fig. 3—Effect of carbon variation on nodular graphite. (A) Silicon 2.83 per cent, carbon 1.97, manganese 0.74, sulphur 0.03 (original) 0.026 (final) magnesium 0.21 (added) 0.15 (final). (B) Silicon 2.82 per cent, carbon 2.71, manganese 0.53, sulphur 0.03 (original) 0.020 (final) magnesium 0.12 (added) 0.07 (final). (C) Silicon 2.52 per cent, carbon 3.31, manganese 0.44, sulphur 0.03 (original) 0.024 (final) magnesium 0.12 (added) 0.11 (final). x 100



nodulizing power in castings poured 16 minutes after treatment.

The first tests were made on low-sulphur irons containing approximately 0.03 per cent S. Introduction of 0.03 per cent Mg resulted in refinement of the flake graphite while some nodules were produced with a 0.06 Mg addition. When 0.08—0.10 Mg was added, a completely nodular structure was produced, provided the residual magnesium was above 0.06 per cent and the silicon above approximately 2.2 per cent (Fig. 1). The carbon content apparently had relatively small effect in the range of 2 to 3.7 per cent.

Silicon contents lower than 2.2 per cent resulted in the occurrence of hard carbides (cementite) in the matrix of the iron. As shown in Fig. 2, increasing amounts of silicon first eliminate the carbide phase and then decrease the pearlite/ferrite ratio in the matrix. Table I shows the effect of silicon and magnesium on the microstructure of low-sulphur (0.03) irons.

Variations in carbon content merely resulted in changes in the amount of nodular graphite present. Fig. 3 shows the effect of increasing carbon content in increasing the size and number of nodules.

Part of the investigation covered the action of the alloy on irons with sulphur contents above 0.03 per cent. It was found that while under laboratory conditions, 0.08 magnesium was adequate to completely nodulize a 0.03 S iron, additional magnesium must be added to irons of higher sulphur content. Magnesium acts as a desulphurizer in high-S irons, and as such it acts to reduce the sulphur content of the iron below the 0.04 limit required for nodulation of the graphite. The actual quantities of the Fe-Si-Mg alloy to be added to high-sulphur irons must be determined experimentally since there is some evidence that the condition of the melt has some bearing on the amount of magnesium required. Its presence as a residual in quantities greater than 0.08 per cent in the cast iron does not have a deleterious effect on the structure

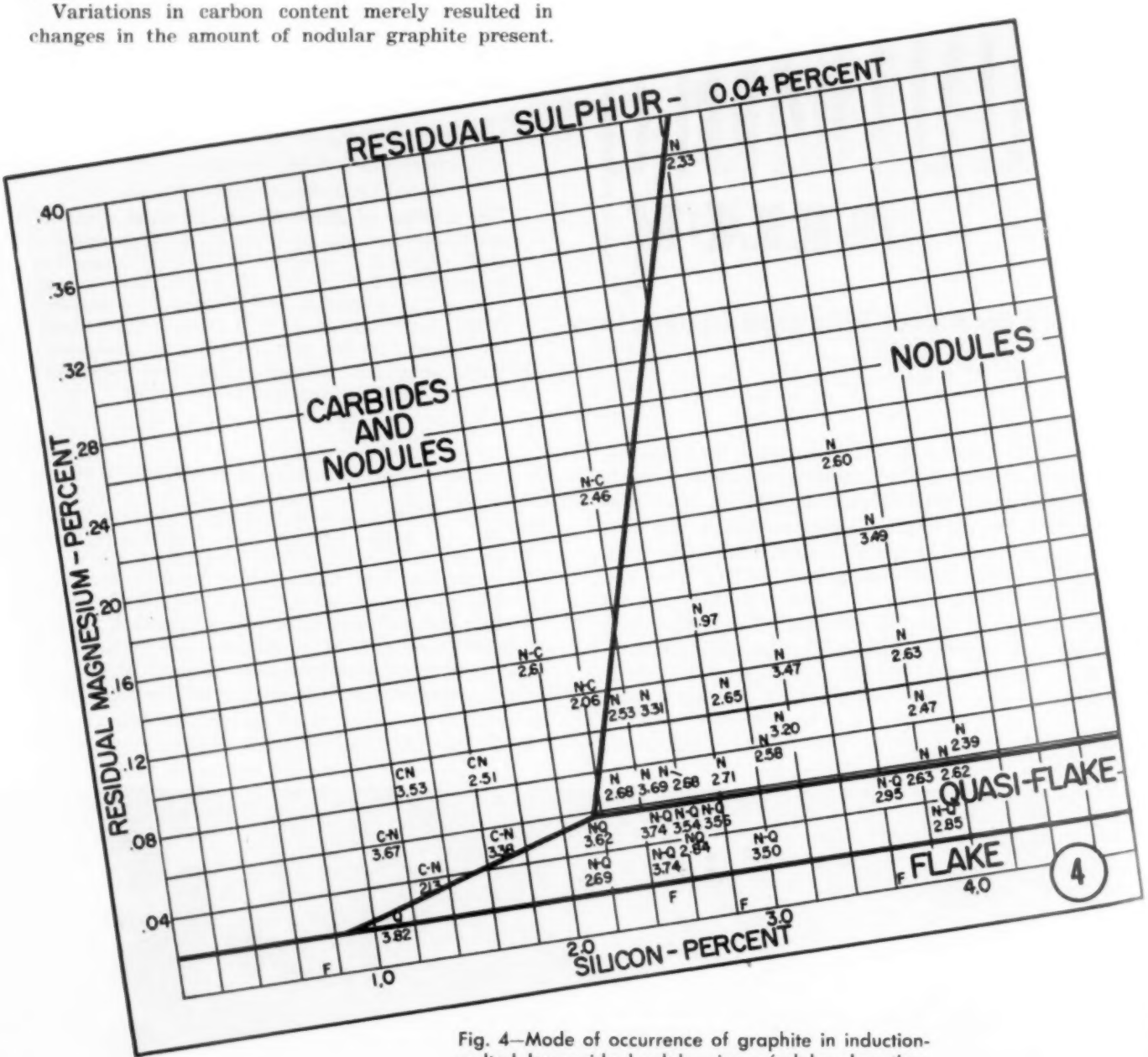


Fig. 4—Mode of occurrence of graphite in induction-melted low-residual sulphur irons (sulphur less than 0.04 per cent). Carbon contents as noted

of the alloy. Table II shows the effect of silicon and magnesium on irons with sulphur contents greater than 0.03 per cent.

Fig. 4 shows the effect of residual magnesium and silicon on structure of cast iron.

Since this investigation was conducted mainly along metallographic lines, tensile data on keel block specimens required by the high-shrinkage nodular cast irons are limited. However, tensile strengths above 80,000 psi and elongations of 8-9 per cent were obtained in the as-cast condition. Table III gives tensile results obtained during the investigation.

A patent application has been filed covering the use and composition of this alloy.

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TABLE I—Effect of Silicon and Magnesium on Low-Sulphur Irons

Heat	Si	C	Mn	P	Sulphur Orig.	Sulphur Final	Magnesium Added	Magnesium Resid.	% Mg Recovery	Nodules	Carbides	Quasi Flake
608-2	1.11	3.82	0.47	.005	.03	.03	.03	.02	67			*
608-3	1.12	3.67	0.43	.005	.03	.023	.06	.06	100	X	*	
608-4	1.25	3.53	0.42	.005	.03	.027	.09	.09	100	X	*	
600-2	1.32	2.13	0.75	.008	.03	.024	.09	.04	44	X	*	
605-3	1.95	2.61	0.44	.008	.03	.024	.16	.14	88	*	*	
605-2	2.13	2.69	0.44	.008	.03	.022	.08	.03	38	*		X
613-2	2.16	3.62	0.86	.007	.03	.03	.12	.05	42	*		X
600-3	2.20	2.06	0.75	.006	.03	.022	.15	.12	75	*	X	
614-4	2.29	2.68	0.54	.006	.03	.023	.12	.07	58	*		
605-4	2.38	2.46	0.44	.007	.03	.026	.24	.22	92	*	X	
613-4	2.45	3.69	1.34	.005	.03	.021	.12	.07	58	*		
613-3	2.46	3.74	0.84	.007	.03	.03	.12	.05	42	*		X
597-2	2.51	3.66	0.45	.003	.03	.029	.03	.01	33			Flake
614-2	2.52	2.68	0.53	.006	.03	.025	.12	.07	58	*		
616	2.52	3.31	0.44	.007	.03	.024	.12	.11	92	*		
613-1	2.59	3.54	0.44	.007	.03	.028	.12	.05	42	*		*
598-2	2.62	2.84	1.01	.014	.03	.022	.04	.04	100	*		*
597-3	2.72	3.56	0.45	.003	.03	.021	.06	.05	83	*		*
614-3	2.82	2.71	0.53	.006	.03	.020	.12	.07	58	*		
600-4	2.83	1.97	0.74	.006	.03	.026	.21	.15	72	*		
607-3	3.03	2.33	0.40	.005	.03	.014	.48	.38	79	*		
598-3	3.08	2.58	1.00	.010	.03	.026	.08	.08	100	*		
597-4	3.16	3.20	0.44	.003	.03	.022	.09	.09	100	*		
607-2	3.59	2.60	0.42	.006	.03	.03	.24	.22	92	*		
598-4	3.81	2.63	0.99	.010	.03	.020	.12	.12	100	*		
609-4	3.83	2.47	0.47	.010	.03	.024	.12	.09	75	*		
609-3	3.83	2.62	0.47	.010	.03	.024	.08	.06	75	*		X

* = Major constituent.
X = Minor constituent.

TABLE II—Effect of Silicon and Magnesium on High-Sulphur Irons

Heat	Si	C	Mn	P	Sulphur Orig.	Sulphur Final	Magnesium Added	Magnesium Resid.	% Mg Recovery	Nodules	Carbides	Quasi Flake
610-2	1.20	3.84	0.49	.005	.10	.06	.04	.03	75			*
611-2	3.43	2.93	0.49	.004	.10	.06	.04	.01	25			Flake
604-2	1.61	3.91	0.42	.010	.10	.08	.06	.04	67			*
612-2	1.11	3.94	0.47	.035	.08	.076	.08	.03	38			*
610-3	1.13	3.95	0.50	.005	.10	.06	.08	.06	75			*
606-2	2.04	2.93	0.42	.006	.10	.07	.08	.04	50			*
611-3	3.51	2.96	0.48	.004	.10	.08	.08	.06	75	X		*
610-4	1.10	3.99	0.50	.005	.10	.06	.12	.09	75			*
612-3	1.68	3.38	0.47	.005	.10	.03	.12	.06	50	*	*	
604-3	2.09	3.81	0.44	.010	.12	.04	.12	.09	75			*
599-3	2.30	2.62	0.96	.010	.12	.05	.12	.11	92			*
599-4	2.46	2.57	0.96	.010	.14	.08	.12	.11	92			*
611-4	3.45	2.86	0.48	.004	.12	.05	.12	.09	75	*		*
599-2	2.53	2.54	0.98	.009	.06	.05	.12	.11	92			*
606-3	2.20	2.64	0.42	.005	.12	.04	.16	.10	63	*	X	*
604-4	2.27	3.80	0.43	.010	.10	.08	.18	.18	100	*	X	*
615-4	2.92	2.65	0.95	.007	.08	.04	.20	.11	55	*		
621-1	3.73	2.68	0.44	.006	.10	.04	.20	.07	35	*		
620-1	3.61	2.95	0.47	.008	.10	.03	.20	.07	35	*		
612-4	1.61	3.51	0.46	.005	.12	.03	.24	.09	38	X	*	
606-4	2.06	2.83	0.42	.004	.12	.05	.24	.16	66	X	*	
615-3	2.27	2.92	0.97	.007	.12	.07	.24	.11	46	X		*
621-2	3.75	2.47	0.43	.006	.12	.06	.30	.12	40	*		X
620-2	4.00	2.39	0.45	.006	.12	.02	.30	.15	50	*		

* = Major Constituent.
X = Minor Constituent.

TABLE III—Tensile Strengths of Nodular Cast Irons

Heat	Si	C	Mn	P	Sulphur Orig.	Sulphur Fin.	Magnesium Added	Magnesium Fin.	% Mg Recovery	UTS	% El	Remarks
620-1	3.61	2.95	0.47	.008	.12	.03	.20	.07	35	67,000	3	As cast
620-1A										60,000	4	Annealed*
620-2	4.00	2.39	0.45	.006	.12	.02	.30	.15	50	83,500	8	As cast
620-2A										82,500	18	Annealed*
621-1	3.73	2.68	0.44	.006	.12	.04	.20	.07	35	71,000	4	As cast
621-1A										60,000	1.5	Annealed* (bad specimen)
621-2	3.75	2.47	0.43	.006	.12	.06	.30	.15	50	82,500	9	As cast
621-2A										77,500	7	Annealed* (bad specimen)

* Annealed 6 hr at 1650° F

Nonferrous Melting

With Induction Lift Coil Furnaces

By W. J. DOELKER
Assistant Chief Metallurgist
National Cash Register Co.
Dayton, O.

OUR production requirements are such that we must produce varying quantities of comparatively small parts which are made from a variety of alloys. We are therefore primarily interested in producing small heats of metal in the neighborhood of 160 lb per charge. Our largest production castings weigh only approximately 1¾ lb per piece and are cast two in a mold, while our smaller castings weigh as little as 1/3-oz and a mold may contain as many as 72 pieces. Such a mold requires only 4 to 5 lb of metal of which only 1¼ lb is required to produce the actual parts.

A high degree of quality must be maintained as many of the parts are in exposed positions on our product, thus necessitating a good surface finish. All the parts have considerable machining performed upon them and in most instances the machined surfaces must be clean and free of any holes or imperfections due to inclusions or segregation.

As a result we have found that, for our particular use, the lift coil type induction melting furnace provides flexibility, speed of operation, ease of handling, and adaptability to our production procedure. Primarily to melt our copper-base alloys, we have installed two high-frequency generator units. One is rated at 100 kw and the other at 175 kw. Each unit has two melting stations but the 100-kw unit is so designed that only one station may be operated at a time, while with the 175-kw unit both stations may be operated simultaneously.

The 100-kw unit has one station equipped with a lift coil furnace and the other station with a tilting type furnace used primarily for producing special ferrous alloys. Both stations of the 175-kw installation are equipped with lift coil furnaces and are used for nonferrous materials.

The principal copper-base alloys used to produce our various castings are shown in Table I.

The 100-kw generator is powered with a 150-hp motor and develops a frequency of 3000 cycles per second. The 175-kw generator is powered with a 260-hp motor and develops a frequency of 960 cycles per second.

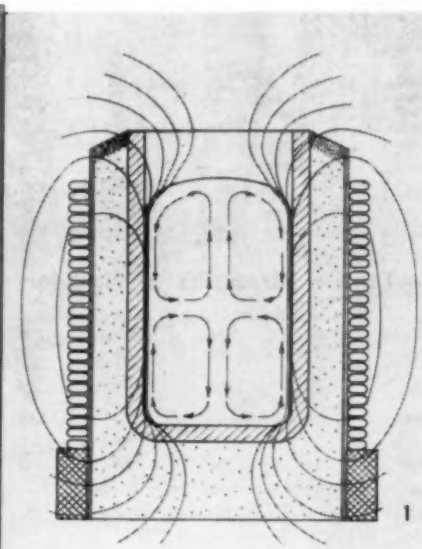
Interlocked tap switches are used which, by means of autotransformer connections to increase or decrease the effective voltage on the furnace coil, insure its ability to draw full power at all stages of the melt. This is necessary as the loading changes with the condition of the charge and the amount of molten metal present. The raw material, as charged, presents a loosely coupled, high-resistance load which is quite different from the full coupling which automatically results when the metal is molten.

The furnace coil, carries the high-frequency current and generates the electrical field to which the charge is subjected. It is made of copper tubing

Fig. 1—Illustrating how the high-frequency induction coil generates the electrical field to which a metal charge is subjected

Fig. 2 — Arrangement of lift coil, crucible and base

Fig. 3 — Two mounts are provided on a wheeled truck at each melting station, permitting one crucible to be charged while the other is used for melting



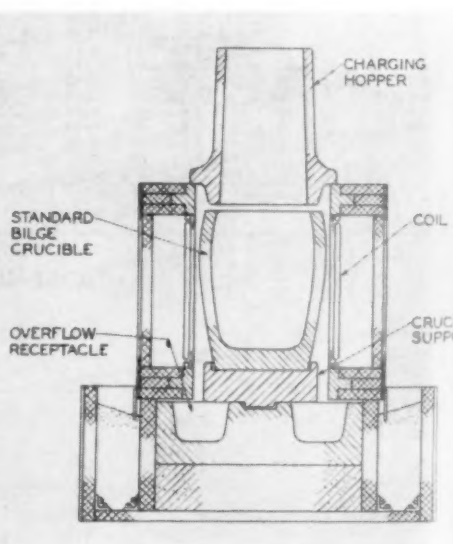


Fig. 4—Induction furnace control panel and two of the melting stations at nonferrous foundry of National Cash Register Co., Dayton, O.

through which water is passed to carry away the heat developed through electrical losses and to keep it from melting. A separate coil, designed to fit each size pot, is recommended for maximum efficiency of operation. The coils have a ¼ to ⅜ in. coating of a non-conducting refractory material, or air hardening cement, which acts as a heat baffle and provides protection against spilled metal which might otherwise cause a short circuit. The coil is supported in an insulated box which, along with all connections, is designed so that the unit may be raised or lowered around the crucible. The coil is designed to fit as closely as possible around the crucible since the efficiency is directly related to the degree of coupling between the two.

The crucible usually used with the lift coil furnace for nonferrous melting is of a medium or low conductivity clay-graphite mix and the heating effect on it is obtained largely from heat in the metal it contains. We are using at present a size No. 50, Type F crucible which holds approximately 160 lb of molten bronze. During the melting cycle the crucible rests on an insulating pedestal that is provided with a sectioned receptacle beneath it for catching spilled metal. Two such mounts are provided on a wheeled truck at each melting station in order that one crucible may be charged while the other is being used for melting, thus minimizing lost time.

The control panel contains the following items, which are used to determine the operating conditions and efficiency of the furnace and to control or adjust the power input throughout the melting cycle:

Main load breaker for energizing the furnace, ammeter, voltmeter, wattmeter, power factor meter, capacitor voltmeter, overload relay, twist type rheostat and voltage regulator to provide control of voltage at all times, furnace tap switch and interlock box containing push buttons for adding or removing capacitors from the circuit.

Static capacitors are used to balance the inductance of the furnace proper and to permit the generator to operate near unity power factor at all times. The capacitors are water cooled and have a high kva rating. Due to their low internal temperature they have extremely long life. (*Please turn to page* 116)

TABLE I—Principal Copper-base Alloys Used

	Per Cent						
	Cu	Pb	Sn	Zn	Al	Mn	Fe
General purpose bronze	89	3	6	2	..	..	..
Hard bronze	85	13	2	..	..	..	..
Zinc-free bronze	91	2	7	..	..	..	..
Valve bronze	87	3	7	3	..	..	..
Antifriction bronze	83	10	5	2	..	..	..
Aluminum bronze	88/91	..	.5	..	9.5/10.5	..	..
Manganese bronze	59	1	1.25	34.25	1.5	1.5	1.5

Developing

Above — Nurse dresses slight burn on employee's arm at Commercial Steel Casting Co., Marion, O.

Left—Dr. Daniel M. Murphy, the company doctor, explains x-ray picture. All employees are x-rayed annually

Below—The author discusses with an employee the results of the latter's annual physical examination

By ROBERT G. SCOTT
Director of Personnel and Safety
Commercial Steel Casting Co.
Marion, O.

a Medical Program

FOR AN AVERAGE SIZE FOUNDRY

Why the average size foundry needs an adequate medical program, and recommendations for its most efficient functioning, are detailed in this paper presented before the second annual Industrial Relations Conference of the Steel Founders' Society of America.

THERE are at least three good reasons for a medical program in the average size foundry.

The first is to insure, so far as is possible, that the people employed have the physical ability to efficiently perform the work required of them without harm to themselves or others.

The next is to prevent acceptance of liability for physical conditions, existent at time of employment, which may later be construed to be, or result in, cases for industrial compensation.

The last reason is to maintain and prolong the productive efficiency of employees, to the advantage of both industry and the individuals themselves.

It is the function of the medical program to achieve these results. This is to be accomplished by arranging the program to include both pre-employment and periodical physical examinations; proper care for industrial injury or illness; advice concerning non-industrial physical conditions and proper follow-up thereon; and close co-operation with and recommendations to the safety and industrial relations departments concerning circumstances which may affect the well being of the employee.

In developing a medical program for the average size foundry, it is proper to begin with the personnel concerned in such an endeavor.

There must, of course, be a doctor to head the program. Inasmuch as the average foundry has no need for and can't afford a full-time doctor, this person will be on a part-time basis. Such being the case, the choice of doctors for this position may be very limited. However, an effort should be made to retain a doctor who is interested in industrial work. The ideal setup for the average foundry is to secure a doctor who does nothing but industrial practice, taking care of several plants.

The doctor should be sufficiently interested in industrial work that he will acquaint himself with the operations and problems of the foundry; see that the plant first aid facilities are adequate; establish or approve rules of procedure for the plant nurses; and constantly consider his practice from the standpoint of both industrial management and the industrial worker so as to give the best service to each of these parties who are vitally interested.

Above all, he must realize that his attitude and his actions have an important bearing on the relation between labor and management. Even though the doctor be only a part-time associate of the company; even though he operates in and from his own private establishment, he should still identify himself as a part of the staff of the firm he represents, and govern his attitude accordingly. Whether *he* considers himself closely connected with the company or not, the *employees* will most certainly do so, and their opinion, good or bad, is going to be reflected upon the management.

One of the most important cogs in the medical program machinery is the plant nurse. It is evident, industry-wide, that few of us have yet given sufficient thought and care to the selection and training of this person.

Her duties are varied, her responsibility great, and, unless she is the exceptional person, she is not trained or experienced in many of the things she is expected to do. After all, we expect her to be a nurse, a representative of the medical department, a representative of the safety department, a representative of the industrial relations department, a stenographer, bookkeeper, file clerk and perhaps storekeeper.

Now, that is a little exaggerated, I know, but there is actually much of each of these jobs required of a nurse in the average size foundry. Don't forget—her attitude and her judgment are going to greatly affect the medical and safety programs, and labor-management relations. That effect must be beneficial.

An important and necessary part of the medical program is the first aid installation. Any average size foundry can afford adequate first aid facilities. In fact, no foundry can afford to be without them.

I would like to explain my use of the word "adequate." No one can tell you what "adequate" facilities would be for your particular plant, because that depends on what you need and what you desire in the way of on-the-job service. In my opinion, first aid requirements depend mainly upon two things—the availability of a doctor and the facilities at his office and the proximity (*Please turn to page* 137)

Spectrographic Determination of MAGNESIUM in

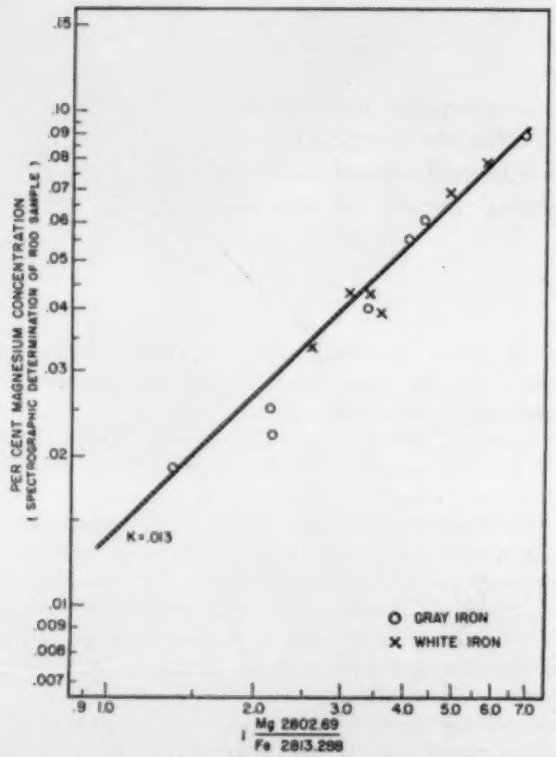

PER CENT MAGNESIUM CONCENTRATION
(SPECTROGRAPHIC DETERMINATION OF ROD SAMPLE)
K=.013
O GRAY IRON
X WHITE IRON
I Mg 2802.69 / Fe 2813.298

Fig. 1—Spark excitation with flat surface. Logarithmic chart shows Mg/Fe plotted against Mg concentration

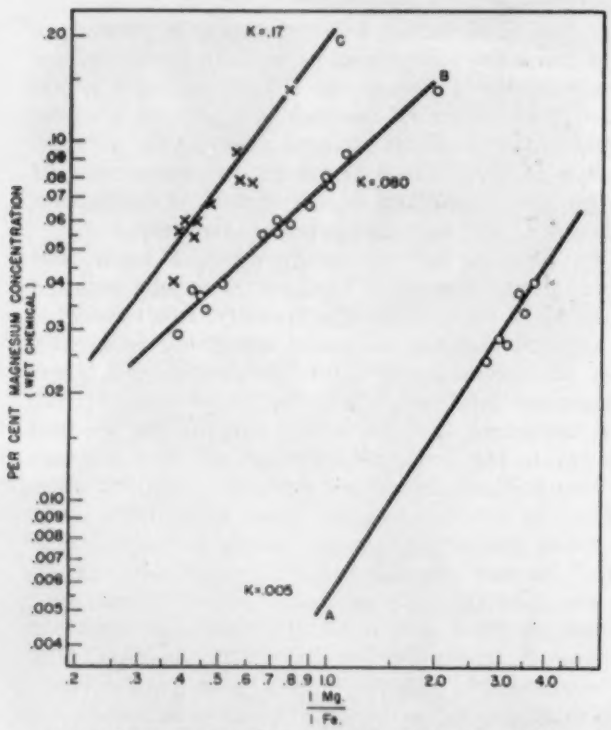


Fig. 2—Arc excitation with rod sample. Chart shows Mg/Fe relationship to Mg concentration, using three different line pairs. Curve A—Mg 2802.69A, Fe 2803.12A. Curve B—Mg. 2779.83A, Fe 2791.79A. Curve C—2782.79A, Fe 2783.69A

A RECENT method[1] for causing nodular graphite structure in cast iron has made necessary a rapid and reliable method for determining its magnesium content. So rapid is the oxidation of pure magnesium and its alloys, when added to iron in the molten state, that it is not possible to estimate percentage recovery. Percentage of magnesium and its recovery are important in that from them recovery curves for different types of iron will indicate optimum quantities of magnesium to be added and the recovery to be expected.

Standards for this method of analysis were obtained from experimental heats in the form of 7/32-in. diameter cast pins. Several samples were analyzed by wet chemical methods in our chemical laboratory.

Apparatus: A Baird three-meter spectrograph (Baird Associates, Cambridge, Mass.) is used in photographing the second order on Eastman Spectrum Analysis No. 1 film. The spectrum is filtered through a Corning No. 9863 filter, 2 millimeters in thickness, and placed directly over the spectrograph slit which is 75 microns. An A.R.L. high-voltage spark unit and ac arc are the excitation sources. An A.R.L. densitometer is used for photometering the lines.

Photometry: Films are developed in Eastman D-19 developer for three minutes, passed through short-stop and fixed 30 seconds in Eastman rapid liquid fix, washed 30 seconds and dried by infrared dryer. Emulsion characteristics of the film is determined using the Churchill Two-line method[2].

Analysis—Standard samples were analyzed by the following wet chemical procedure developed in our chemical laboratory:

Weigh 1 to 5 gms of the iron (according to the expected Mg content of the sample) into a 500-cu cm beaker and dissolve in HCl (1:1). When solution is complete, add HNO_3 slowly to the hot solution to oxidize the iron. This requires about 1 ml of acid per gram of iron. Care must be taken in adding the HNO_3 that the solution does not froth over. Boil the solution down to about 15 ml. Transfer to a 300 or 500 ml heavy walled separatory funnel, using small portions of dilute HCl (sp gr 1.10) to wash out the beaker. Keep the volume to a minimum not exceeding 60 ml after it has been transferred to the separatory funnel.

Place "rubber policeman" over drain end of separatory funnel and place funnel in an ice bath. Cool to about 5°C, add 30 ml of ether per gram of iron

in CAST IRON

By W. R. KENNEDY
American Cast Iron Pipe Co.
Birmingham

and cool to 5°C. Stopper the funnel, shake gently for a few minutes, and cool occasionally. Let stand for 5 minutes and draw off the acid into the original 500 ml beaker. Add to the ether-iron solution in the separatory funnel 10 cc of a cold solution HCl (sp gr 1.19) to which ether has been added. (100 ml of 1.19 HCl will dissolve approximately 150 ml of ether.) Cool and again shake. Drain off this acid layer into the beaker. Repeat the last operation. Discard ether-iron solution in the separatory funnel. Warm the beaker on a hot plate (never over a flame) to expel the dissolved ether. The iron left in the acid extract should be oxidized and the complete ether extraction repeated.

After repeating the extraction as above, warm the beaker to expel the dissolved ether. Add 20 ml concentrated HNO_3, take to very low volume and repeat HNO_3 additions until all HCl has boiled out. Cool slightly, dilute with distilled H_2O to about 15 or 20 ml. Add 3-4 grams of sodium chlorate, heat until manganese has precipitated. Let stand 1 hr, filter through No. 42 paper (suction preferred). Wash three times with a 1 per cent solution of sodium chlorate. Discard the precipitate.

Transfer the filtrate from the suction flask to a 500-ml beaker and boil the solution to about 20-25 ml. If any manganese precipitates, filter once more. Add 15 cu cm 1:1 HCl and take to dryness. Take back up in 25 cu cm 1-3 HCl and let come to a boil. When all is in solution filter on a filter rack through a No. 40 paper, wash two times with hot 1-3 HCl and three times with hot distilled H_2O . To the filtrate add 1½ to 2 grams of ammonium chloride. Add NH_4OH until ammoniacal, heat and filter off remaining iron through a No. 31 paper on the filter rack, wash three times with a 1 per cent solution of HN_4OH.

Make the filtrate slightly acid with concentrated HCl, then just slightly ammoniacal with NH_4OH. Transfer to a 1-liter flask and dilute to about 150 ml. Gas with H_2S, 30 to 45 minutes. Let stand for ½ hr. Any remaining iron that would come down in the magnesium pyrophosphate precipitation will be eliminated here.

Filter through No. 42 paper (on suction) into clean flask, wash three times with H_2O saturated with H_2S. Transfer the filtrate to a beaker large enough to safely hold the volume on boiling and boil to expel the H_2S.

After the H_2S is gone add about 25 cu cm of 1-1 HCl. Boil the solution down to about 150 cu cm. Filter on a filter rack through a No. 40 paper, washing with a little distilled water. Discard paper and contents. The filtrate should not exceed 250 ml. Neutralize the solution with NH_4OH and then make just slightly acid with HCl, then add 30 ml. of a saturated solution of ammonium oxalate, heat to near boiling and add NH_4OH slowly and with stirring until the solution is ammoniacal. Boil 1 to 2 minutes. Digest ½ to 1 hr. Cool to room temperature and filter off the calcium (if any) through a No. 42 paper (suction preferred) wash with a cold 1 per cent solution of ammonium oxalate.

Transfer the filtrate to a 500-ml beaker. Evaporate to 300 ml. Acidify with concentrated HCl. Cool the beaker and solution in an ice bath, add 10 ml of a 25 per cent solution of $(NH_4)_2HPO_4$, then NH_4OH slowly until alkaline to litmus. Continue to stir and keep in ice bath. Add 10 cu cm NH_4OH in excess and continue stirring until magnesium precipitates. Let stand for at least four hours, preferably overnight.

Filter on suction through No. 42 paper, wash with dilute NH_4OH (1.19). Discard the filtrate, wash out the flask and place funnel back in flask. Dissolve Mg precipitate with hot 1:2 HCl, wash well with hot H_2O. Transfer the filtrate to a 500 cu cm beaker and repeat the precipitation of the magnesium.

After reprecipitating and filtering, transfer the paper and precipitate to a weighed platinum crucible, char the paper without flaming, burn off the carbon at a temperature below 900°C, and finally ignite to constant weight at about 1100°C in a muffle furnace.

A blank should be carried through the procedure with a Mg-free iron.

The weighed apparent, $Mg_2P_2O_7$ should be checked for Mn.

It is important to note here that both the wet chemical and the spectrographic methods obtain total magnesium percentage and not metallic magnesium alone.

Spectrographic Rod Technique—Samples are ground to a 120 degree included angle and two pins are used as electrodes. Samples are pre-arced at 2.5 amperes, 2500 volts ac for ten seconds and exposed for nine seconds. Magnesium shows a very mild reduction in intensity ratio with increase in pre-burn time.

Fig. 2 shows a plot of (*Please turn to page* 182)

TABLE I

PIN METHOD—ARC				FLAT METHOD—SPARK			
No. Run	Individual Est. %	Dev.	Dev.²	No. Run	Individual Est. %	Dev.	Dev.²
1	.034	.0015	.0000023	1	.037	.002	.000004
2	.036	.0005	.0000003	2	.037	.002	.000004
3	.033	.0025	.0000063	3	.039	.000	.000000
4	.035	.0005	.0000003	4	.037	.002	.000004
5	.038	.0025	.0000063	5	.043	.004	.000016
6	.037	.0015	.0000023	6	.042	.003	.000009
Av. Mg % =	.0355			Av. Mg % =	.039		
Dev² =			.0000178	Dev² =			.000037

Std. Dev. $= \sqrt{\frac{\text{Dev.}^2}{N}}$ $= .0017$ $=$ 4.9% of Mg content

Std. Dev. $= \sqrt{\frac{\text{Dev.}^2}{N}}$ $= .0024$ $=$ 6.3% of Mg content

NEW Nonferrous Foundry

Is Clean, Light, Well Planned

Fig. 1—Exterior view of the new foundry building of Central Brass & Aluminum Foundry, St. Louis

Fig. 2—Core oven designed and built by Francis T. O'Hare, company president, for his original foundry is still in use

Fig. 3—Bench and floor molding area with the

By ROBERT H. HERRMANN
Associate Editor
THE FOUNDRY

NEAT, clean, light and airy, modernly equipped and well planned—these are the impressions one gets of the Central Brass & Aluminum Foundry, 2140 Clark Ave., St. Louis. Francis T. O'Hare is president of the foundry, incorporated two years ago when operations were moved into the new building. Previous to that, Mr. O'Hare had operated the old foundry at 21st and Randolph Sts. for 26 years. He is an old timer in the business, having been an early member of the St. Louis District Foundrymen's Club before it became the St. Louis District Chapter of the American Foundrymen's Society in 1935. For the past 15 years his son Arthur, vice president of the firm, has had an active part in the business.

The new foundry building, which is centrally located and just three blocks from the railroad station, is constructed of cement block with a brick front, a solid cement floor, and measures 50 x 130 ft. The office and a pattern storage room are located to the front of the building, shown in Fig. 1. A shipping room, 20 x 40 ft, is attached to the left side of the main building at the front, opening onto the main street. The driveway into the shipping room slopes down toward the back so that the floors of the shipping trucks are level with the floor of the foundry to facilitate easy loading. Two air compressor units are located at the rear of this room—to insure a cleaner and cooler supply of air. One of the compressors supplies molding machines and the other furnishes compressed air to the sand blast units.

The main foundry area is located behind the office and pattern storage rooms. A 10-ft aisle lengthwise down the center of the building divides the floor space into two 20-ft work areas which house, on one side, coremaking and machine molding operations, and floor and bench molding and cleaning operations on the other. Large steel sash windows located in the walls along these areas provide ample daylight illumination. Only on extremely dark days is artificial light required.

Construction of the windows creates a system of natural ventilation that helps keep the foundry clear of fumes and dust. The windows might be described as being of the transom type. A lower section, and about one foot above it, an upper section, open by pivoting on a horizontal axis. Thus the warm and dusty air goes out through the top opening and clean air is drawn in at the bottom. As a further aid to ventilation, windows are located in a ridge constructed lengthwise the middle of the roof. They may be opened or closed by chains which hang down within reach from the floor.

An outstanding feature of the building is its roof, which is of prefabricated wood construction; a section of it can be seen in Fig. 5. It is known as a Lamella roof and is of German design patented in 1908. Support members are (*Please turn to page* 214)

cleaning department shown just beyond the double doorway

Fig. 4—View of the furnace area showing movable furnace hoods

Fig. 5—Machine molding area with the coremaking section shown at extreme right. A section of the self-supporting wood roof also can be seen

Controls Are Stressed by British Steel

By VINCENT DELPORT
European Manager
THE FOUNDRY

PRODUCTIVITY has become the watchword in industrial Great Britain. For the last two years, the government has been urging managements and workers, through employers' associations and the trades unions, to employ every possible means to increase production per man-hour by individual effort, by organization, and by the use of machines, so as to enable the nation to recover its prosperity and, once again, to stand on its own feet.

Many firms, however, have not waited for government exhortations to improve their methods so as to attain greater productivity and efficiency. F. H. Lloyd & Co. Ltd., steel founders at Wednesbury, near Birmingham, is a striking example of this continuous effort, over a number of years, to achieve greater production per man-hour at a cost that will ensure the sales of their castings in a competitive market, while maintaining consistent high quality.

The company, which was founded in 1879, manufactures steel castings for engineering, ranging from a few ounces in weight to 25 tons; it is equipped to take quantity production orders as well as single units. Its present output is at the rate of 18,000 tons of finished castings annually. The keynote of its success is complete control of manufacture, from the time the specification for an order has been received until the casting is delivered. Equally important is the close co-operation between the executive, the management and the workers.

The general control of production starts in the office of the managing director, where a Productrol board, devised by the Wassell Organization, Westport, Conn., compares the company's actual performance for the year to date with the plans laid down by the management. This is done in respect of tonnage delivered, tonnage cast, tonnage of finished castings, tonnage of orders booked, scrap and rejects, tonnage produced per employee, and wages and salaries paid per ton produced; other corresponding financial information is also to be recorded in future. On the left of the board is a card index, which gives the

el Foundry

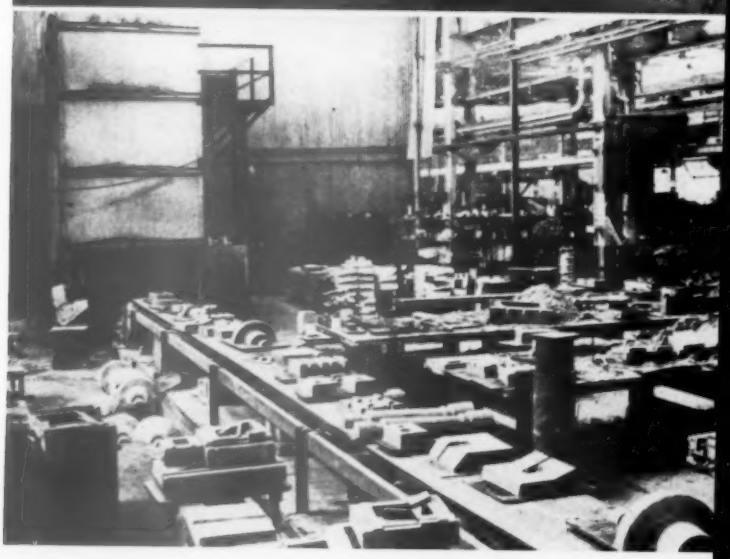


Fig. 1—Mechanical testing laboratory of F. H. Lloyd & Co. Ltd. near Birmingham, England

Fig. 2—Melting equipment includes these two 10-ton electric arc furnaces

Fig. 3—Control board used to measure the company's actual performance record

Fig. 4—Withdrawing a charge from 5-ton capacity electric heat treating furnace

Fig. 5—Coreroom of medium machine molding foundry

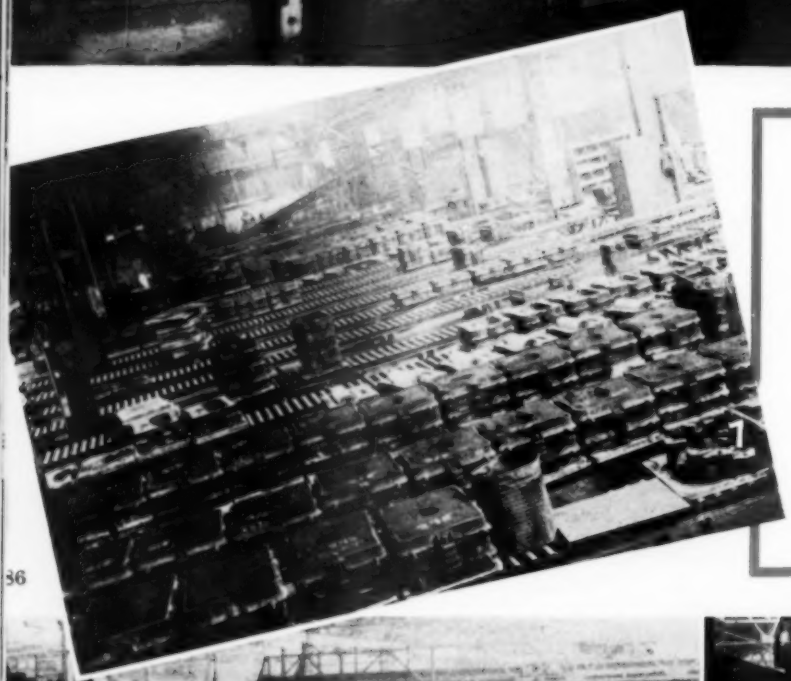


Fig. 6—Coreroom supplying the light foundry

Fig. 7—General view of conveyor lines in light foundry showing molds set out for pouring

Fig. 8—Medium machine molding section of the heavy foundry

Fig. 9—One bay of the heavy molding shop

Fig. 10—Finishing section of the light foundry

Fig. 11—Cleaning room for heavy castings

Fig. 12—Operating a swing frame grinder

actual figures from which the statistics are derived; above the board are charts showing information such as upward and downward trend of production, costs, etc., which is better illustrated in graphical form.

Importance is attached to production per employee, and the yardstick employed is the ratio of total production to the total number of employees, including staff and management. This is claimed to give a more accurate picture of efficiency, since the rate of productivity should reflect the effectiveness of people employed in ancillary departments and in the clerical staff. The total number of employees is also taken into account for the purpose of rating wage and salary cost per ton. The chart giving production per man shows that, during recent years, the rate has been gradually moving upward, thanks to constant improvement of organization, pruning of staff, merging of departmental sections, and so on. The total number of employees for the whole works is about 1450, including some 275 on the staff (including foremen). About 950 workers are employed in the foundry, cleaning and despatch department, and pattern shop. The remaining 225 are people employed in the engineering and machine shops.

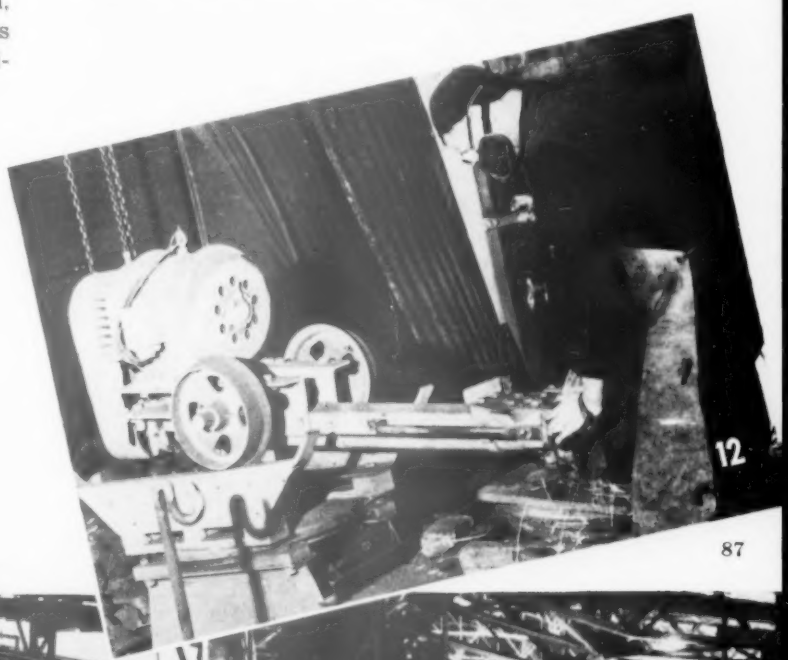
The undertaking itself is divided into a number of divisions, each having a responsible manager at its head. These are responsible for the operation of the foundries, engineering section, materials provision, and metallurgical, personnel, and sales sections. Heads of divisions meet every morning in the managing director's office. Thus, while each division is self-contained, there is continuous co-ordination, and decisions, affecting the organization as a whole, are made in the presence of all whom they may affect. This co-ordination also is extended to all the company's employees by means of the works council.

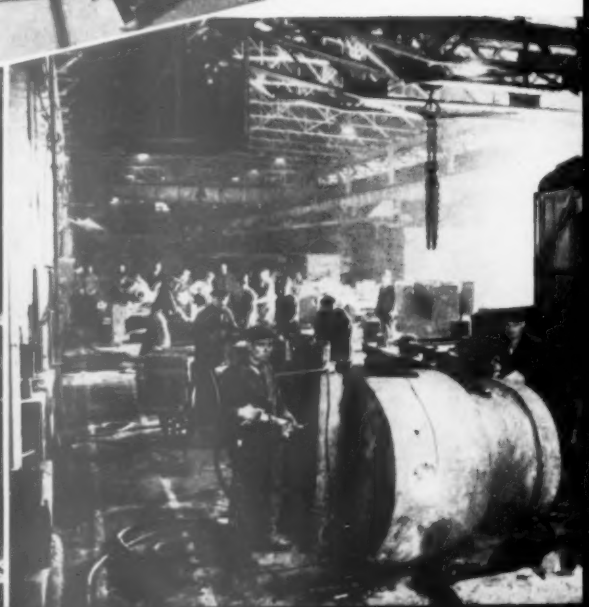
Customers' orders, when received by the works from the sales section, are typed out on master order forms, designed for reproduction on a machine which enables separate sheets to be run off for each item on the order (orders may have any number of items, from one to fifty or more). To meet the needs of all sections for information, from 19 to 24 reproductions from the master order are required from each production item.

Planning and rate-fixing is done in the production control room, where a staff of approximately 20 is employed. In the planning section are 10 Productrol boards, corresponding to different categories of work (light, repetition, etc.), and which are used for loading the work and reserving capacity. The boards are divided into 52 horizontal lines, one for each week of the working year. The capacity in "allowed hours" is plotted against these lines.

A green marker is used for the forward load, and shows the number of allowed hours for "expected orders" with date of delivery; this means that, as soon as the specification and date of delivery for an order has been received, this order takes its place on the board and is therefore planned, even before the official order has been received. A yellow marker is used for the "dead load," and gives the number of allowed hours for the preparation of the order—pattern, tackle, etc., up to the time of molding. A pink marker is used for the "live load," and shows the number of hours allowed for making and finishing the casting. Eighty per cent of the foundry's capacity is thus planned, leaving a margin of 20 per cent for day-to-day jobs.

Another set of boards co-ordinates the progress of complete orders for each customer; it shows, for each





customer's orders, when the pattern is ready, the cast date, date of delivery to the machine shop, and date of delivery to the customer. It will be appreciated that different items of customers' orders have to be planned on different sections of the foundries, and the function of this set of control boards is to ensure that all items become available for delivery by the specified date. For this purpose, items are grouped together, according to contracts falling due for delivery at the same time.

A "dead load" file is kept, which gives all particulars of progress during the pre-production stages. Copies of instruction cards, and of the "methods instruction cards" referred to below, are kept and used for repeat orders; any modifications made to the original pattern, or difficulties that may have been encountered in the course of manufacture, are recorded on these cards. There is also a register of all orders on hand, which gives the exact position of each item on order at any time, and on each card there is a space for recording any important points that arise in the course of correspondence with the customer in connection with his order.

When the order is completed, its record card is transferred to a "dead file" and classified for reference; it is kept in case of a repeat order, or an order for a similar casting. This saves time when such an order is received, as, for instance, the means adopted to remedy a defect are recorded, and the defect will thus be avoided when dealing with the new order: time is also saved in planning the work for the new order.

Continuous study is applied to improvements in layout of the shops, and modifications to production operations are studied in detail before they are actually adopted. For instance, it may be necessary to improve the flow of work in one of the cleaning sections. A model of the department, complete with machines and equipment, has been constructed, and various schemes can thus be worked out; when all concerned are satisfied that the best arrangement has been arrived at, the new equipment and necessary transformations can be made in the shop with the maximum prospect of success, and the minimum degree of interference with the work in progress.

When the specification of an order has been received, the pattern and tackle are thoroughly studied, and contact is made with the customer so that any improvements in design can have consideration. Orders are given a tackle reference, which defines the production section where they are to be made, and the order can thus be loaded onto the production board.

An important feature of the undertaking is the pattern inspection department, which is separate from the pattern shop. Here, every pattern is inspected and checked with its drawing, whether it is made in the firm's pattern shop, or supplied by the customer, or subcontracted to a firm of patternmakers. This department deals with production as far as possible ahead of actual molding. An instruction card is prepared, showing a sketch of the casting, with the positions and sizes of the heads, gates and runners (these are actually supplied with the pattern equipment in the majority of cases), and this goes to the molding department. If any difficulties are encountered in this department, they are immediately reported to the pattern inspection department, to which the card is returned, and any necessary alteration is then made. thus, there is complete co-operation between the molders and the department responsible for the patterns.

As already stated, a copy of the completed methods instruction card goes to the production control room. On patterns where special heads are not supplied, the position of the heads is painted in aluminum paint. The sketch of the castings, shown on the methods instruction card, is prepared in the pattern inspection department and duplicated so that copies of this sketch are reproduced on, or attached to, every card that goes to the various departments and to the production control room.

Thus, the production control room functions as the nerve center of the whole foundry organization.

Efficient control and organization go hand in hand with modern plant and equipment in the foundry. The foundries, including cleaning and shipping sections, occupy a covered area of approximately 31,000 square yards. There are two entirely separate foundry units. The light foundry—known as Heath Works—covers an area of 6800 square yards. Two bays are allocated to jobbing work, two to machine molding, and a further bay is divided into the apprentice training section and the core room.

The heavy foundry covers an area of 13,000 square yards, and consists of three (*Please turn to page* 168)

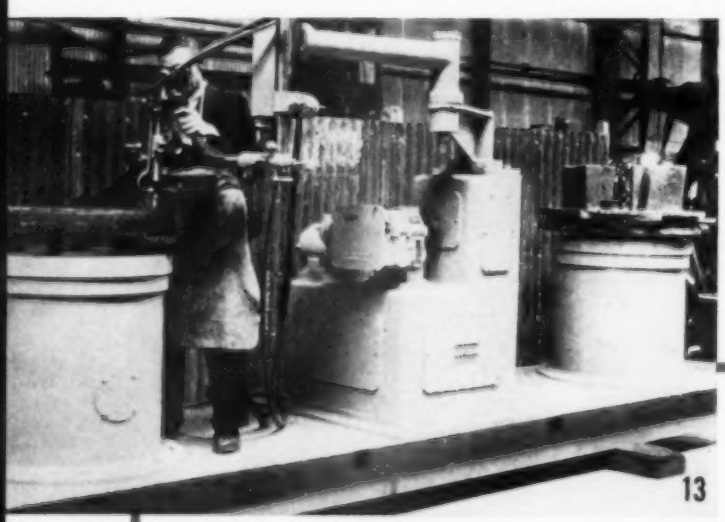


Fig. 13.—Burning off risers from castings by means of special machine developed by the company

Fig. 14—Cleaning large castings by hydroblasting

Fig. 15—Foundry apprentices in the classroom

Fig. 16—Partial view of the pattern storage area

Fig. 17—Showing a portion of the pattern shop

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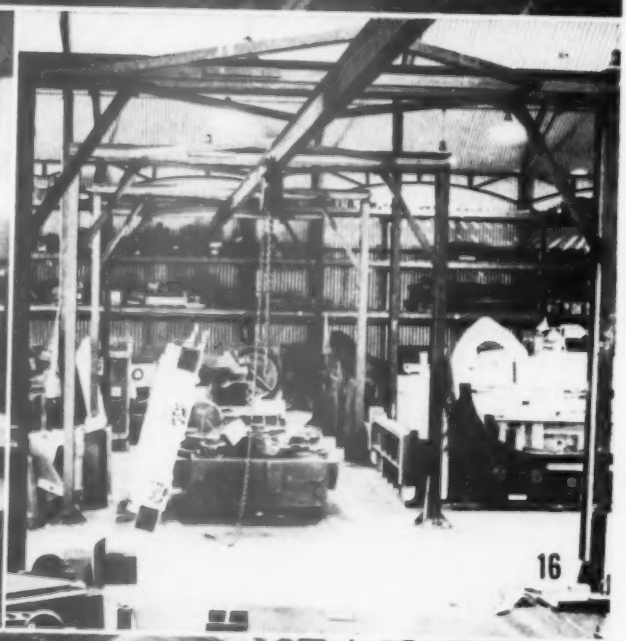

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17

Use of the sandslinger and core blowers in production of molds and cores for the steel foundry are discussed by the author. This is the fourth and concluding article of a series which started in the July issue

Machine

OF STEEL CASTINGS

By JOHN HOWE HALL
Consultant
Swarthmore, Pa.

THE sandslinger was developed later than jolters and jolt-squeezers, with which it competes for the favor of the foundryman, but it has certain advantages which have led to its wide adoption for certain classes of steel foundry work. No hard-and-fast line can be drawn between classes of work suitable for the slinger and those better handled on other types of machines. In some instances the choice would appear to have been dictated by the personal views of the foundry superintendent, rather than by any pronounced advantage of the type of machine.

Slingers are made in a wide range of sizes, from the very large self-propelled machines running on a track, to small portables movable by crane. They may be fed with sand entirely from a conveyor, as shown in Fig. 26, or may have mounted hoppers, filled by buckets carried by the crane, and large enough to supply sand for an hour's operation or more. A slinger, like any other molding machine, is rather expensive, and operating cost is by no means negligible. A slinger, therefore, should be operated as nearly as possible at full capacity. To secure this result, patterns to be used with slingers as a rule are mounted on cope and drag boards, and for strictly production work it may even be desirable to have two machines, one for drags and one for copes.

Of course, it is quite possible to use a slinger for molding from loose patterns suitable for hand ramming. However, when the machine is first started, the stream of sand tends to move the pattern about on the board. Patterns, therefore, must at least be pinned to the boards. When a split pattern is being used to make up a cope on a drag, the pins holding the two parts together must make a good fit to prevent shifts. Nevertheless, the smaller types of slinger often are used to ram both copes and drags with loose patterns, split or otherwise, and with or without follow boards. Bedding-in a pattern, or ramming a false cope, would not be accomplished readily with one of these machines.

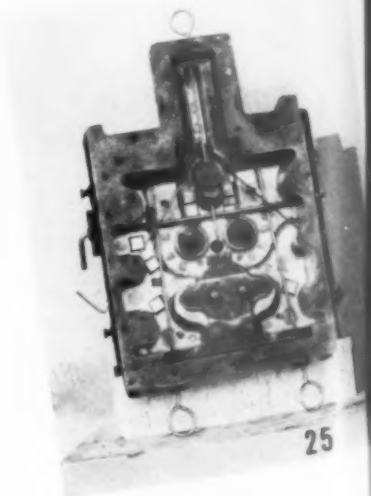
Economy of installing a slinger for making work of this sort, instead of ramming the molds by hand, or making the drags on plain jolters and hand molding the copes, will depend largely upon whether or not it is possible to keep the slinger busy a proper proportion of the time. This is not as easy as might appear at first sight. The machine fills flasks so rapidly that often it is difficult to bring flasks, gaggers and patterns properly prepared for molding to it fast enough to keep it busy. The whole molding floor must be geared to the job of feeding work to the slinger.

In designing coreboxes, patterns and flasks for use with slingers, there should be no deep, narrow openings into which sand has to be thrown. The impact of the stream of sand against the sides of such an opening cuts down its velocity. It is not rammed hard at the bottom of the space, and soft spots appear in the mold. When such pockets are unavoidable, the best practice is to first throw in enough sand to cover the pattern to a (*Please turn to page* 174)

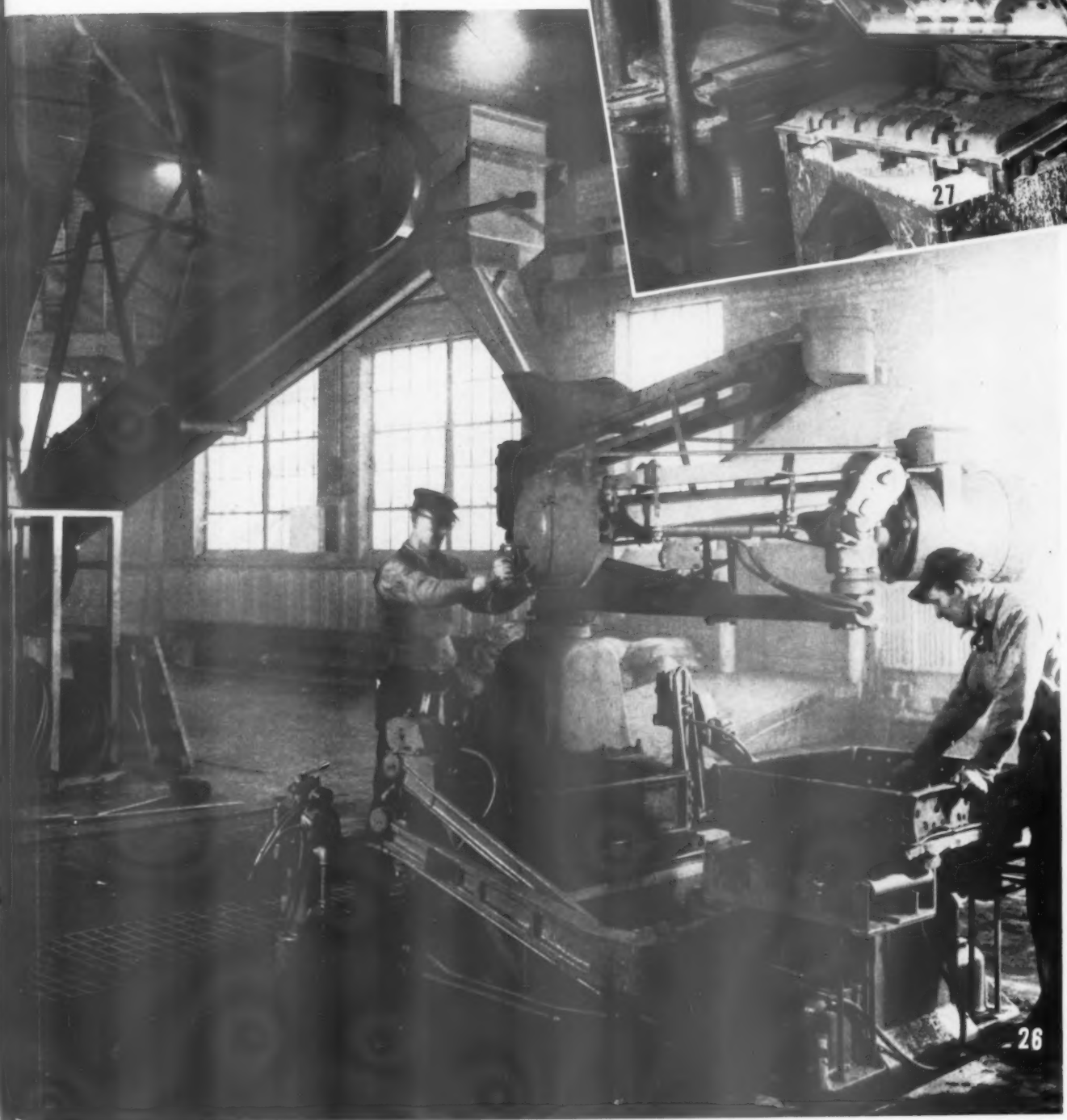
Fig. 25—Venting in some cores is accomplished by inserting rods or wires in the box which are withdrawn before the box is opened

Fig. 26—Pedestal type sand-slinging unit operated in connection with a rollover draw machine

Fig. 27 — Core blowing machine. Blow holes and air vents may be seen in the top of the corebox



Molding



Bell Making Is One of Oldest Trades

By PAT DWYER
Engineering Editor
THE FOUNDRY

ABOUT 4500 years ago, more or less, a Chinese emperor commissioned one of his skilled nonferrous foundrymen to cast a set of tuned bells. Presumably, individual bells had been cast before that time. As with many other remarkable achievements, history is discreetly silent on the method employed in designing and casting a group of bells to meet a definite musical scale. Because of lack of communication between East and West, knowledge of the art did not reach Europe until about the 14th century. Since that time the voice of the bell has become a familiar sound in practically every land under the sun. Bells mark time for those that go down to the sea in ships and they enter into the activities of almost numberless people who never saw, and never expect to see the sea. Bells are traditionally associated with places of religious worship, with schools, meeting houses, etc., and play a prominent part in ceremonies connected with joyous or sorrowful occasions. One need not speak the language of a foreign country to interpret the message of its bells.

The spirit of emulation and ambition developed to the highest point in race horses and in many men, prompts desire to attempt more and more difficult tasks. In this particular case the result is shown in the production of larger and larger bells. The famous great bell of Moscow marks a peak along this line. The bell is 19 ft in diameter, 22 ft high and is estimated to weigh 220 tons. Modern engineers and foundrymen well may lift their hats in respectful admiration of those master mechanics whose bones long since have moldered to silent dust. Apparently, details of how they handled the molds and melted the metal for this and other large bells, died with them.

From old illustrations we gather that the inside of the bell was built up with bricks and covered with loam swept to the desired shape. An extra thickness of loam or clay was applied to correspond to the thickness of the desired metal. The outside or cope

Fig. 1—Bell casting just taken from the mold

Fig. 2—Applying coating of loam to the iron form

Fig. 3—Pegs hold loam firmly on the cope face

Fig. 4—Showing the method of holding the outside sweep accurately in place

Fig. 5—Illustrating how the cope form, not yet coated with loam, fits over the drag

was built around this core with bricks and loam reinforced with wrought iron bars. When the cope was lifted off, the loam or clay layer was removed from the core. Inside and outside were touched up and finished, and any devices or letters were stamped in the face. The same general procedure is followed down to the present, with the single exception that cope and drag are swept separately in cast iron flasks conforming closely to the size and shape of the bell. Small and, in some cases, medium size bells weighing 300 to 500 lb are made from patterns, but many medium size and all large bells are made in loam molds swept to shape.

Bell making runs in families, and the art is handed down from father to son. The Meneeley Bell Co., Troy, N. Y., where the accompanying pictures were taken, now is operated by the fifth generation of bell makers. According to Clinton Meneeley, the only modern change has been the development of electrical ringing equipment. Otherwise, he claims, his great grandfather would find nothing strange in the plant, except perhaps the telephone, the electric light and the typewriter.

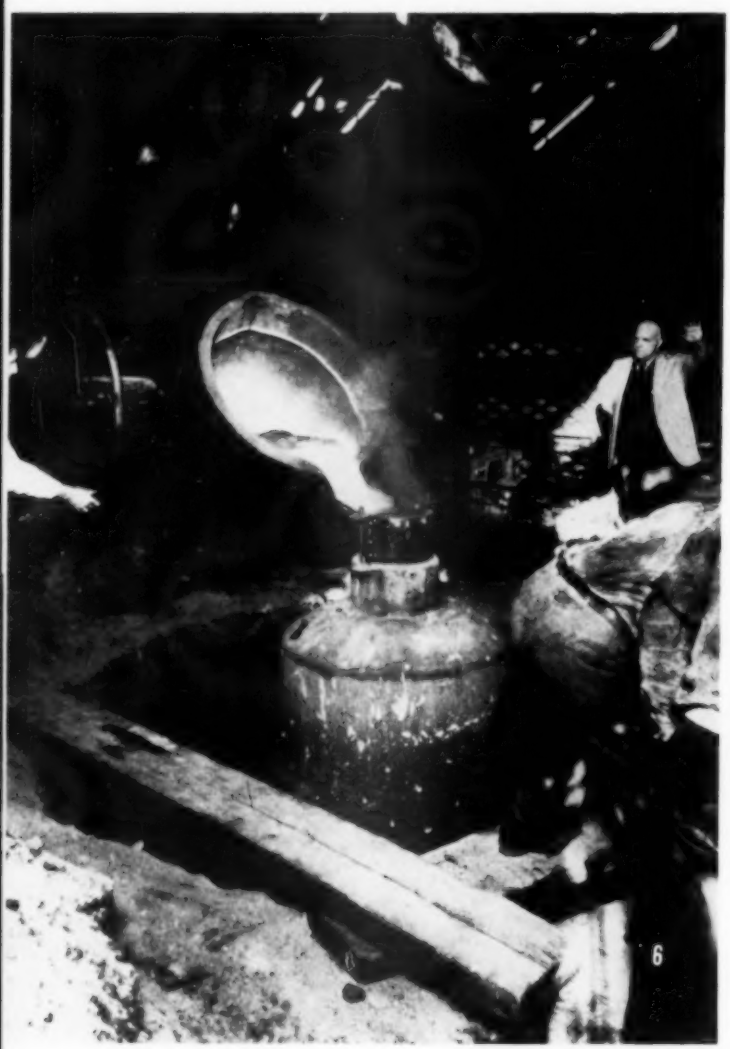


Fig. 6—Pouring a bell casting at the Meneeley Bell Co., Troy, N. Y.

Fig. 2 shows the molder applying a coating of loam to the iron form, mounted true and level on blocks on the foundry floor. Within definite limits the form will serve for different bell diameters by varying the thickness of the loam coating. Each layer is allowed to dry or stiffen before the next layer is applied. The final coat is a thin slurry, squirted from a gun or thrown on by hand from a small receptacle. According to usual loam molding practice, this final coat is finished by revolving the sweep in the opposite direction employed for manipulating the rough loam. An extra smooth finish is imparted by going over the surface with a camels hair brush dipped in a thin solution of molasses water and blacking. At the bottom the sweep also forms the usual type tapered parting which guides the cope into place.

To hold the loam firmly on the cope face and prevent slippage, especially with a maximum thickness, short 1-in. square pieces of wood are driven in the vent holes, as shown in Fig. 3. Why this does not prevent normal venting of the mold filled with metal is just one of those things where theory and practice fail to coincide peaceably.

Spindle Rests on Center Pin

Method of holding the outside sweep firmly and accurately in place is shown in Fig. 4. The lower end of the spindle rests on a pin in the center of the top opening in the cope. The upper end engages a pin in the cross bar extending from one side of the cope to the opposite side. The ends of the bar are supported by upright members attached to the flange of the flask, and at a height sufficient to permit the sweep to revolve underneath. Obviously the sweep setting is a precise and delicate operation usually performed by a master patternmaker. Not only must the profile conform accurately to the drawing, but allowance must be made for shrinkage and contraction of the casting.

For many bells, a slight variation in the thickness of metal is not an important factor. In the majority of instances, particularly where bells are mounted in groups, a slight variation in thickness will affect the accuracy of the musical note and thus destroy the harmony of the group. The customer specifies the size and weight of the bell, also the note to be struck in the musical scale. The experienced bell maker designs a bell to meet these requirements.

Fig. 5 merely illustrates one of the last steps in the process. A glance will show that the drag is covered only with the first rough loam coat, and the cope has neither wood plugs nor loam on the inside.

For convenience in pouring, the mold is lowered into a pit in the floor as shown in Fig. 6. A runner basin on top conducts the metal from the ladle to one, two or more vertical gates on top of the bell crown and thence to the remainder of the mold cavity. A bell casting taken from the mold is shown in Fig. 1. Later the surface is cleaned and polished. The bell then is mounted on a special device where it is tested for weight, dimensions and the note in the musical scale for which it was designed.

Grinding Problems IN THE MALLEABLE IRON FOUNDRY

The author answers a number of questions concerning grinding of not only malleable iron but also other types of castings. This paper was presented before the 12th annual Wisconsin Regional Foundry Conference

By A. S. RAKESTRAW
Norton Co.
Chicago

THIS discussion covers a number of questions commonly asked concerning grinding operations in the malleable iron foundry. The questions, many of which are equally applicable to other types of foundries, may be divided into three groups: Those relating to foundry costs; those applicable to what might be termed the mechanics of grinding, and those having to do chiefly with application of grinding wheels for specific jobs.

The first question on costs is: What is the best method of checking wheel cost—by weight of castings ground, by weight of gates removed, by wheel life in hours, or by employees' earnings?

Any one of these methods may, or may not, provide an accurate wheel cost depending on the uniformity and selection of castings to be considered.

The first method—by weight of castings ground—would provide a fairly accurate check on abrasive cost per ton of castings produced, providing identical castings, having the same amount of material removed per casting, were selected for test. A casting being produced in large quantities provides an ideal medium for test. In this case, a check test may be run by merely recording the number of castings ground on an abrasive wheel by a given operator. Similarity of the castings permits computation of all essential test data such as tons produced, pounds of material removed per hour or per wheel or cost per ton.

If the question refers to weight of castings of any and all patterns, the variables resulting from this method would preclude the possibility of 100 per cent accuracy.

If any tonnage of miscellaneous castings were to provide an accurate means of determining abrasive cost, there would of necessity be a definite relationship between weight of castings and material removed by grinding. It has been our experience that there is no definite relationship between finished weight and rough casting weight. Identical castings produced by two different foundries are sometimes gated differently. Within the same foundry, it is unlikely that the same percentage by weight of gates and risers and flash are removed from castings of different unit weights. These small variations have a tremendous effect on the resultant abrasive cost.

The second suggested method of determining abrasive cost is by weight of gates removed. This method, providing the procedure is accurate and the same type of castings is selected should prove most satisfactory. However, a number of factors affect this method, which should be very carefully supervised.

Castings used for such a test should be of the same general classification with respect to accessibility and types of gates. If different patterns are selected, approximately the same quantity of each pattern should be used for each test.

Extreme care should be exercised in recording the weights of castings and containers, before and after grinding. Too often, only the approximate or average weight of the container or platform is taken for computing the net weight of the load.

We have observed tests where the castings as well as the container included packing material in varying amounts, sufficient in quantity to seriously affect accurate casting weights. Defective castings should be re-weighed with ground castings, otherwise their weight would show up as material removed.

Often an accurate determination of the material removed on a small number of representative castings along with a record of the total number of castings ground, provides a more accurate method than the prolonged, tedious process of double weighing each batch of castings.

The third suggested method is by wheel life in hours. Most of the objectionable factors pertaining to the previously suggested methods would seriously influence a comparison of this kind.

Effective life of an abrasive wheel depends largely upon speed of operation, pressure applied, types of castings and method of application. It would be necessary to eliminate all of the variable factors, confine the test to one operator, (*Please turn to page* 184)

Questions AND

Wants To Stop the Metal Flow

Q.—We are planning an overhead system for handling molten iron from the cupola to 500-lb capacity bull ladles, and have the problem of stopping the flow of iron from the spout while ladles are being changed, without bodding up the cupola. While that requires only a few seconds the flow must be stopped as a safety measure. We cannot use a mixing ladle or tilting spout because the cupola spout is not high enough above the floor.

A.—So far as we know, the flow of iron from the spout cannot be stopped without using some type of holding or tilting spout. One foundry with a similar trouble dug a pit in front of the cupola for installation of the mixing ladle, and then placed a hoisting mechanism in the tramrail system at this point which lowers a section of that with the bull ladle to the desired position for receiving metal. Safety catches prevent movement of the trolley during that operation. When the ladle is filled the whole section is raised to form a continuous track to permit the filled ladle to be moved away.

Another foundry devised a tilting spout about 4 ft long which only tilts slightly. The spout is pivoted in front of the cupola with a stop at the back to prevent tipping back too far. A spout of that length which is 6 in. deep and 8 in. wide would hold about 400 lb of iron. If the headroom is not sufficient for that, the tilting spout could be made shallower and wider.

Sand for Aluminum Castings

Q.—We manufacture aluminum alloy castings and use No. 00 Albany sand. We would like information on the permeability of sand for average bench work, and the moisture content. What is meant by flowability of sand? Would you recommend a coarser sand than No. 00?

A.—Albany sand of the grade you mention is being used satisfactorily for production of aluminum alloy castings where an extremely smooth surface is desired. The No. 00 grade has an AFS grain fineness of over 210, and as might be expected its permeability is low. If fine, smooth surfaces on the castings are not a specific requirement, you might get more satisfactory production results by using a coarser grade such as No. 0 or even No. 1 Albany. However, it would be advisiable to purchase only small lots of the coarser grades, and try them out on a variety of castings on an experimental basis before making a complete changeover. Moisture content for naturally bonded sands may range from 6 to 8 per cent, and there again, it is advisable to vary the moisture content and determine the most suitable amount.

Permeability of sands used for aluminum ranges from 5 to 15 although in some cases it may be considerably higher. As pointed out previously, one must compromise between casting finish, and freedom from blows and gas porosity due to low permeability. Flowability of a sand refers to its ability to move under application of force such as ramming or jolting so that it surrounds the pattern completely, and results in a surface of uniform hardness. Usually the finer grain sands possess greater flowability than coarser grain sands.

Aluminum Bronze Production

Q.—We would like to obtain all the information we can secure on molding, melting and pouring of aluminum bronze.

A.—Your inquiry is rather a large order, and it will be impossible to do more than touch upon a few highlights in the space at our disposal. Aluminum bronze is a high-shrinkage alloy and requires adequate feeding through large risers located over heavy sections. Where that is impractical, chills must be employed to obtain the desired rate of solidification. Aluminum in the bronze tends to cause inclusion of aluminum oxide skins, and the gating system must be designed to permit entry of the metal into the mold cavity without turbulence, or hard impingement on cores or other obstructions to the metal flow. Castings preferably should be gated at the bottom, and if possible also gated from the riser.

Sand should have a good permeability, and both green and dry sand molds are employed. Castings not subject to pressure may be made in green sand molds, but in some cases skin drying may be necessary. For complicated shapes and pressure-resisting castings dry sand molds should be used. Adequate venting in all cases is a must.

Pouring temperature will range from 1950 to 2150° F depending upon the section thickness, intricacy, and use of chills. Melting procedure follows that of other copper-base alloys—melting as rapidly as possible under slightly oxidizing conditions, and

ANSWERS

removing from the furnace when the metal is 50 to 100° above the pouring temperature to hold gas absorption at the minimum. Charcoal often is employed as a cover, but it should not be placed in the bottom of the crucible.

Stirring previous to skimming should be gentle and from the bottom upward so that the surface skin of aluminum oxide is not broken. Skimming only should be sufficient to remove the debris on the melt surface. In pouring keep the lip of the crucible as close to the sprue as possible to eliminate splashing and entrainment of air.

Melting Steel Scrap in Cupola

Q.—We have plenty steel scrap of all kinds available. Is it feasible or practicable to melt 100 per cent steel scrap in the cupola and obtain metal suitable for gray iron castings? We have been using 30 per cent steel with some additions of graphite, with satisfactory results. Casting thickness varies from ½ to 3 in. Weight from 5 to 500 lb. Cupola is lined to 20-in. diam. Present charges include 250 lb iron and steel scrap, 40 lb coke splits, small amounts of limestone and soda ash. Blower displaces 800 cfm. Metal is hot enough to pour thin castings. We are inclined to the opinion that with necessary adjustment of silicon and manganese it will be possible to use all steel charges. We shall appreciate an expression of opinion.

A.—So far as melting is concerned, all steel charges have been melted for many years in cupolas supplying converter units, and in plants producing hard iron balls used in grinding mills. However, in the first instance, melting the metal is only part of the process. The molten metal is poured into a suitable vessel where a blast of air converts it into steel. In the second instance, the metal is white and hard, with practically all the carbon in the combined form. Excellent metal for the purpose for which the balls are intended, but totally unfit for ordinary gray iron castings.

We do not know of any foundry in this country regularly melting all steel scrap in the cupola and treating with alloys for the production of ordinary gray iron castings. In certain process irons, with which you probably are familiar, steel scrap additions to the cupola charge in some instances run as high as 80 per cent.

Instances have been noted in foreign publications of more or less experimental work in the conversion of steel scrap charges into metal suitable for gray iron castings. In each instance the metal from the cupola first was poured into pigs, and afterward remelted. This was to check the uniformity of analysis.

Off hand we are not in position to say whether lack of wide spread adoption of the process is due to the economic or metallurgical factor. Where gray iron pig and scrap are available, the foundryman is not tempted to try any substitutes. Where the cost of alloys is comparatively high, the temptation to produce a synthetic iron, does not appeal.

In direct and brief answer to your question, suitable synthetic iron can, and has been produced in the cupola from all steel scrap charges with suitable additions of graphite to raise the carbon, and sufficient ferrosilicon and ferromanganese to raise these elements to the desired point. With your successful experience in using 30 per cent steel in the charge, you should have no particular difficulty in handling all steel charges.

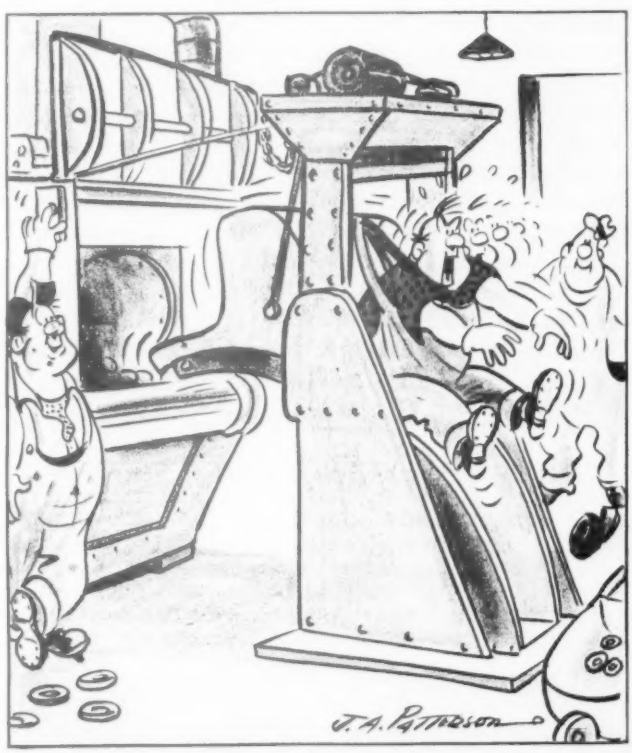
Cores Stick in Metal Drier

Q.—We are blowing cores and using one half of the box as the drier. Trouble has developed due to the cores sticking to the drier section after baking, making removal difficult. Can you suggest any means for overcoming the sticking?

A.—It appears to us that some change has been made in the core sand mix; assuming, of course, that the operation previously has been trouble free. It might be that a sticky type of core oil is being used, or an excess of oil is being employed. Perhaps the moisture content is higher than advisable, although that usually shows up in the blowing operation with a tendency

GANGWAY!

By J. A. PATTERSON



"Okay, Okay, you birds win. Let me down; th' blond's telephone number is Highland 6733."

Questions AND ANSWERS

for the sand to stick in the hopper.

Cleanliness of the boxes might have a bearing in that the sections used as driers become covered with a gummy deposit or coating. The boxes must be clean. It might be a good idea to spray the boxes with a thin coating of kerosene or light mineral oil previous to blowing in the sand.

Making Tellurium Mold Wash

Q.—In the July issue of THE FOUNDRY we saw reference to a tellurium mixture showing that it was composed of 32 per cent tellurium, 60 per cent silica, 6 per cent alumina and 2 per cent iron oxide. It also sets forth that after plumbago is added to bring it to 27° Baume, ¼-pint of core gum is mixed to the consistency of molasses and added. We would like to know what the various materials such as silica, alumina, and core gum are.

A.—Our first suggestion relating to the tellurium wash mentioned is to get in touch with the author of the article on the details and reasons for the particular method involved. While we are not sure, we believe that the tellurium mixture mentioned was compounded to meet the indicated analysis of a core wash described by Vadeboncoeur in a paper at the 1945 annual meeting of the American Society for Metals. The wash contained about 20 per cent water in addition to the mentioned ingredients—and we suspect that the suspension agent for the tellurium was bentonite which is in the range of the silica, iron and aluminum oxides indicated. Vadeboncoeur also mentioned diluting the paste or wash with plumbago.

Of course, one could mix silica flour, aluminum oxide powder and iron oxide powder with tellurium in the dry state as mentioned in the article, but we believe that mixing tellurium with bentonite will give the same result. We do not know what the core gum is, but have an idea it is liquid sulphite binder such as used for cores. If bentonite is used, we do not believe that the sulphite would be necessary. In connection with use of tellurium, your attention is directed to the existence of several patents relating to its use directly as an addition to molten metal, and in the form of a core or mold wash.

Pattern Surface Is Not Smooth

Q.—In the process of entering the field of production foundry work we are doing a great deal of aluminum casting for pattern work. Even though we are using a special sand for the purpose, we still have trouble with rough surfaces. We also would like to have information on use of plastics or cements for patterns.

A.—Without a specimen of the castings available for examination it is difficult to determine whether the roughness you mention is the result of use of too coarse a sand or to some other feature due to improper sand conditions. Possibly the sand may be worked on the wet side resulting in a boiling action. Again the sand may not have enough bond, and tends to wash or erode when the molten metal stream passes over it. As previously mentioned, your special sand may not have the desired grain size to produce the required smoothness of surface. Obtain a small quantity of sand which has a grain fineness number of 200 or higher and see what results are obtained.

In addition to metal alloys a number of materials are used for patterns. These include litharge-linseed oil-sand mixture, proprietary pattern compounds, gypsum, portland cement, and plastic resins. Proprietary pattern compounds may be secured from the manufacturers and foundry supply houses with full directions on use. Material is in powder form which is mixed with water and poured into a sand mold. Litharge-linseed oil-sand mixture while used mainly for follow boards also is used for patterns. One mixture is composed of 40 parts by weight of dry, baked molding sand, 1 part of litharge, and sufficient boiled linseed oil to bring it to the consistency of green molding sand. That material is rammed into a sand mold, removed and allowed to dry in a warm place. Then it is given several coats of shellac to protect the surface.

Applications of synthetic resins or plastics as they often are termed are increasing and a number of articles on the subject have appeared. These include "Matchplate Patterns from Phenolic Casting Resins" by C. R. Simmons which appeared in the November, 1946 issue of THE FOUNDRY; "Plastic Patterns" by R. H. Herrmann, July, 1947 issue: "Plastic Matchplates Made by New Process" by D. W. Talbot and J. L. Lessman in the February, 1948 issue; "Matchplates Made from Plastic" in the August, 1948 issue, and "Thermoplastic Patterns" by T. H. Dickinson, in the March, 1949 issue of THE FOUNDRY. With resins the molds are made of plaster of paris or gypsum, and the resin in liquid form is poured into the cavity where it is allowed to remain for 3 to 4 hours to partially harden. Then mold and contents are baked for 8 hours at 140° F to complete polymerization or hardening after which the patterns are removed from the mold.

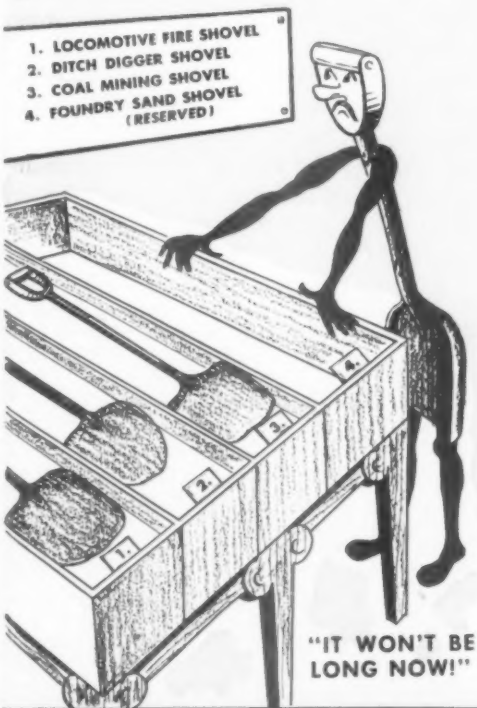
Metal Boils in Bushing Mold

Q.—We are enclosing small disk cut from bushing stock. We shall appreciate your opinion on the cause of, and the proper method to adopt for prevention of such defective areas in this type casting.

A.—The machined surfaces of the sample submitted indicate that the metal composition and melting practice are satisfactory. Therefore, responsibility for the defect apparently lies in the molding practice. Character of the defect indicates that for one, or possibly for a combination of reasons the metal *boiled* violently in the mold. This boiling action produced a quantity of froth or scum which floated a certain distance and then became attached to the core or to the outer wall of the mold. Here it remained while the clean metal flowed past and filled the mold. Assuming that the bushings were cast in a vertical position, the most probable cause of the trouble is

(*Concluded on page* 100)

The Self-Propelled Self-Loading ROYER SAND CONDITIONER



It won't be very long until the Royer Sand Conditioner makes a museum piece out of the old fashioned foundry sand shovel . . . in the same way that mechanization has made the shovel obsolete in so many other industries. The new Royer does everything needed in sand preparation without wasteful and back breaking labor. It scoops up sand, mixes, culls out trash, and aerates *up to 50 tons per hour* of light, gas-free, perfectly blended and uniformly granulated sand, suitable for the highest grade castings. The Royer Sand Conditioner has reduced sand department costs wherever it has been installed. Why not find out what it can do for your foundry? Write for full information.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

Questions AND ANSWERS

(*Concluded from page* 98)

the attempt to crowd too many patterns in a flask. When the mold cavities are filled with molten metal, the volume of steam created exceeds the permeability capacity of the sand. A certain amount enters the metal and produces the boiling action with the resulting formation of metallic froth. The obvious remedy is to provide greater space between the patterns, and in addition run a ring of vent wire holes down around each pattern, before the pattern is removed from the mold.

Composition for Church Bell

Q.—Can you supply us with information on a suitable composition for a brass or bronze church bell 24 in. in diameter?

A.—Standard composition for bells for years is a bronze composed of 80 per cent copper and 20 per cent tin, although the tin content may vary from 18 to 22 per cent; one maker favors a 78 per cent copper-22 per cent tin alloy. Bells usually are made in dry sand or loam molds and gated at the top, using a basin or runner box which is plugged. When the basin is full, the plug is pulled, permitting the metal to flow into the cavity below.

Zinc Oxide Builds Up on Mold

Q.—We are pouring yellow brass and manganese bronze into permanent mold castings and are having difficulty with build up of zinc oxide on the mold walls. A carbon coating is employed, but it does not prevent the deposition of the zinc oxide coating, which is hard to remove.

A.—Zinc boils at slightly over 1700° F, consequently it is desirable to melt and pour zinc-bearing alloys at the lowest possible temperature which will produce sound castings free from cold shuts. Due to volatilization of zinc and evolution of zinc oxide fumes, the alloys should be poured hard and fast so that the mold is filled as quickly as possible, and to that end the gating system often has a larger cross-sectional area than in the case for red brasses. In some cases where pressure resistance in the casting is not a problem, the addition of 1 to 2 per cent Al will aid in suppressing the zinc fumes. However, the aluminum oxide skin which is formed may result in inclusions in the castings, and care must be taken to devise a gating system which will prevent turbulence.

Mention is not made of how the carbon mold coatting is applied. That is, whether it is applied directly to the mold surface or upon a clay or other refractory coating. You may find it less difficult to remove the zinc coating if such an undercoating is used. Under present conditions, it is advisable to set up a routine cleaning procedure to maintain the mold face in the best possible condition by preventing build up of the zinc oxide. Perhaps use of an air blast after each pour may remove the slight deposit formed. Again you may have to use a wire brush after a definite number of castings have been made.

Desires Data on Sand Cooling

Q.—We have a customer who has requested a roll conveyor layout. In this connection the question has arisen as to how rapidly sand molds lose their elevated temperatures after pouring has been completed. Steel flasks measuring 12 x 18 in. with 3-in. cope and drag are used. Maximum quantity of metal in the mold at any time will be 18 lb. Metal is yellow brass poured at 2100° F. If you have any data on mold cooling under operations of this nature, we would appreciate having them.

A.—We do not know of any information on the rate at which sand cools after being raised to an elevated temperature. However, the question arises in our mind whether you are interested in that, or in how long it takes the casting or castings to solidify so that they may be removed from the mold. Unfortunately, there is no usable information on that as far as brass is concerned although some data are available on cast steels.

While you mention that there is 18 lb of brass in the mold, there will be considerable difference in solidification time if it is in the form of a number of ¼ or ½-in. thick castings or if it is in one or two solid chunks; the latter will take considerably longer.

The only way we know of actually determining when the castings are sufficiently solid to be shaken from the mold would be to perform that operation at various time intervals after pouring. Another procedure would be to insert thermocouples in the heaviest section, and find the time at which the temperature drops below the solidus—which is from 1810 to 1840° F for the 85-5-5-5 alloy.

In the case of comparatively thin castings poured in green sand, the drop from 2100 to say 1810° F will occupy a comparatively short time. We have observed in brass foundries the setting up of six molds which were poured. A few minutes after pouring the molds were shaken out, the sand tempered and placed back on the heap for further use.

Sand Condition Causes Trouble

Q.—We are sending you a small nameplate casting which contains numerous irregularities on the surface which look like blisters or boils. Can you tell us what is the cause, and how we can overcome the trouble?

A.—The little blisters or boils as you term them are the result of some steam or gas forming material in the sand. Contact with molten metal developed a small spirt or jet of gas which was injected into the iron just as the skin was formed. One cause of such trouble is the presence of clay or sand balls resulting from improper sand mixing or conditioning. Presumably you are using a facing sand on the nameplates to obtain a suitable surface, and we suggest that you check its making to see that the resulting sand is uniform and free from small lumps or balls.

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Ohio MAGNETS

A-1920

Men OF INDUSTRY

GEORGE J. LEROUX, assistant manager, Cleveland Works, National Malleable & Steel Castings Co., has completed 50 years of service with the firm. During a vacation period, while attending St. John's College, Mr. Leroux joined the old Toledo, O., plant of the company as a foundry timekeeper. He subsequently held the positions of foundry foreman and production clerk at that plant and in 1918 he became employment manager there. The following year he was transferred to the Cleveland Works and served as employment manager until 1926, when he was appointed assistant manager. He is an active member of the Northeastern Ohio Chapter of the American Foundrymen's Society.

♦ ♦ ♦

Richard H. Marshall has become associated with Climax Molybdenum Co., New York, as a member of its metallurgical staff in Chicago. Mr. Marshall until recently was production metallurgist, Timken Roller Bearing Co., Canton, O., where he was engaged in research on high-carbon steels and metallurgical inspection and heat treating of production steel.

♦ ♦ ♦

J. B. Neiman has been appointed to the executive staff of U. S. Reduction Co., East Chicago, Ind. Mr. Neiman will assist in both the purchasing department and in the sale of aluminum alloy ingot. For the past 15 years he has served as general manager of the aluminum department of the Federated Metals Division, American Smelting & Refining Co., and has been president of the Aluminum Research Institute for 8 years. As in the past he will make his headquarters in Detroit and operate from his present office at 729 Fisher Bldg.

♦ ♦ ♦

John F. Livingston, recently elected chairman of Central New York Chapter of the AFS for the year 1949-50, is assistant plant engineer, Crouse-Hinds Co., Syracuse, N. Y. Mr. Livingston studied metallurgy at Syracuse University and became associated with Crouse-Hinds Co. 27 years ago. He was in charge of foundry engineering and maintenance for several years prior to being appointed assistant plant engineer. He served as vice chairman of the Central New York Chapter last year, and will act as secretary of the New York State Regional Foundry Conference, to be held in Syracuse, Nov. 25-26.

♦ ♦ ♦

Changes in field sales personnel have been announced by Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Philadelphia. **Charles D. McIntire** has been named chief industrial sales manager of the Cincinnati branch office, succeeding **George Brown** who has been transferred to Cleveland to supervise sales of the company's Belfield Valve Division. **John E. MacConville** has been appointed Atlanta branch office sales manager for Brown Instruments Division, also supervising industrial sales activities out of the Birmingham, Jacksonville, Fla., and Knoxville, Tenn., offices. **William C. Waltman** has been put in charge of industrial sales out of the South Bend, Ind., office, succeeding **George Gilliam,** who has been made supervisor of all pyrometer supplies sales for the company.

♦ ♦ ♦

C. W. Weedfall has been appointed foundry and production engineer, Benton Harbor Malleable Industries Inc., Benton Harbor, Mich., where he will supervise pattern and die design, rigging, tooling and sales engineering. Mr. Weedfall, a graduate of Tri-State College of Engineering, has spent the past two years in patent developments and selling of gray iron castings and nonferrous parts. For many years he was associated with the Saginaw Malleable Iron Plant of General Motors Corp., Saginaw, Mich., where he supervised pattern and process equipment, and later automotive steering gear design. Prior to that he was design engineer, Baker Perkins Co., Saginaw, Mich.

♦ ♦ ♦

Elden T. Davis has been appointed comptroller and assistant secretary of the Cleveland Chain & Mfg. Co., Cleveland, and its associated companies, Bridgeport Chain & Mfg. Co., Bridgeport, Conn.; Woodhouse Chain Co., Trenton, N. J.; Seattle Chain & Mfg. Co., Seattle, Wash., and Round California Chain Co., Los Angeles and San Francisco. A graduate of

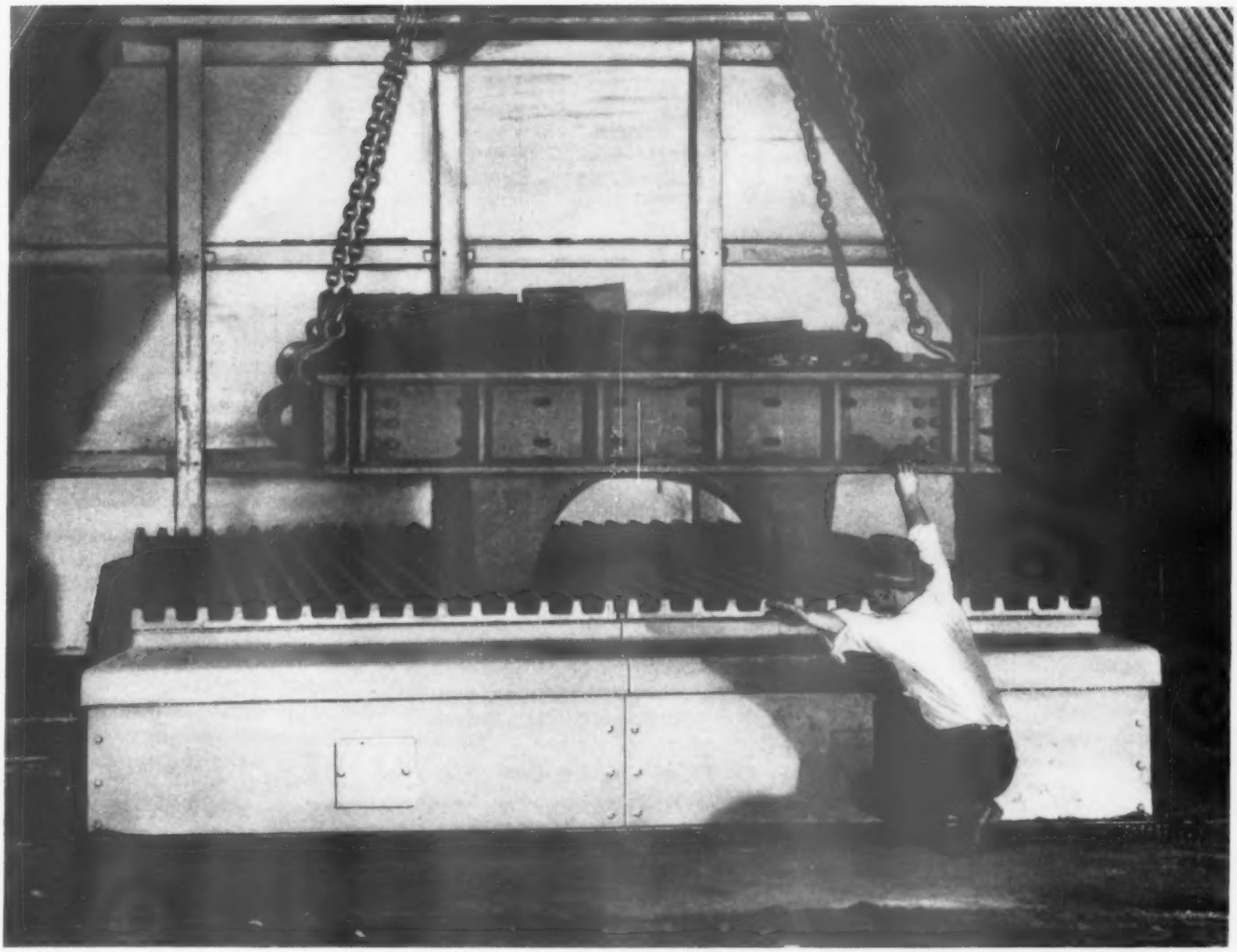
(*Continued on page* 104)

GEORGE J. LEROUX

RICHARD H. MARSHALL

J. B. NEIMAN

JOHN F. LIVINGSTON



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. . . yet gentle as a lamb with your flasks and castings

This Robins Floatex Shakeout can handle your really big jobs.

It can shake out your flasks in minutes—even seconds.

And it can do so *without damage to your castings!*

Yes, it's big . . . it's fast . . . and it's gentle. And it does its job by *shaking the flask—not the building!* It holds its vibration completely within its own live frame . . . where it is needed. Vibration can't escape to weaken building structures, to collapse unpoured molds, to get on your workmen's nerves.

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FLOATEX SHAKEOUT

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ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

Men OF INDUSTRY

(*Continued from page* 102)

University of Pittsburgh, Mr. Davis has been a member of the financial division of Cleveland Chain & Mfg. Co. for 23 years.

• • •

George W. Cannon was retired as chairman of the board of directors of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., by resolution of the board, as of Aug. 31. Mr. Cannon had been associated with the organization since its inception. He served originally as vice president, became president in 1944 following the death of Donald J. Campbell, and chairman in 1947. Receiving his early foundry training as an apprentice, journeyman and foreman, Mr. Cannon joined with Mr. Campbell and Ira A. Wyant in 1905 to establish a foundry in Chicago. The move to Muskegon in 1908 was followed by steady expansion paralleling that of the automotive industry which the company has principally served, the organization now embracing six plants with a combined daily capacity of 1000 tons of castings. Mr. Cannon has always been intensely interested in and contributed to the advancement of the foundry industry from the standpoints of metallurgy and production methods and the furtherance of hygiene, safety and good housekeeping. He played a leading part in the recent establishment of the so-called Muskegon Plan for foundry training of boys at the Hackley Manual Training School, Muskegon. Active in affairs of various foundry associations, he is a past national director of the American Foundrymen's Society. He is also a member of the Foundry Industry Advisory Committee to the Munitions Board. Mr. Cannon plans to devote his time wholly to research and the further development of ideas and methods for the betterment of casting quality and production. Currently he is in Europe where he will study foreign foundry operations.

• • •

Joseph H. Parsons and **Robert B. Pogue** have been appointed vice presidents and **Rosser L. Wilson** has been appointed chief engineer of the Brake Shoe & Castings Division, American Brake Shoe Co., New York. Mr. Parsons, formerly assistant vice president, will be in charge of miscellaneous castings sales. He joined the company as an apprentice in 1913, following graduation from Princeton University. Mr. Pogue, formerly chief engineer, continues in charge of engineering. He has been with the company since 1916 and chief engineer of the division since 1937. Mr. Wilson, a graduate of Purdue University, has been with the company since 1935 as an engineer, and until recently was assistant chief engineer.

• • •

Ray T. Melville, formerly sales representative, Hanna Furnace Corp., Buffalo, has been named Buffalo district sales manager, succeeding **William Kerber,** a vice president, who was recently transferred to Detroit. **Carl A. Harmon,** until recently chief metallurgist, has been appointed sales manager of pig iron specialties for all districts, with headquarters in Buffalo.

• • •

Samuel H. Reynolds has been appointed sales manager, Electrode Division, Great Lakes Carbon Corp., Niagara Falls, N. Y., succeeding **George O. O'Hara,** who has resigned to establish his own sales agency in California where he will represent the Electrode Division and other manufacturers. Mr. Reynolds, who attended Massachusetts Institute of Technology and Harvard Business School, has been associated with Crucible Steel Co. of America, New York, for the last 24 years, since 1941 as manager of stainless steel sales.

• • •

Norman F. Hindle, for the past 2 years assistant professor of mechanical engineering, University of Idaho, Moscow, Idaho, has been made a full professor and head of the mechanical engineering department at the university. Mr. Hindle is well known to the foundry industry, having served for a number of years on the staff of the American Foundrymen's Society. A graduate of Purdue University, he joined American Steel Foundries in 1925, as laboratory chemist at its Alliance, O., plant. In 1926 he became chief chemist of the company's Indiana Harbor, Ind., plant, resigning that position in 1928, when he joined THE FOUNDRY, Cleveland, as assistant editor. He returned to American Steel Foundries in 1931 as chief process inspector and in 1933 went with the American Foundrymen's Society at Chicago. He was appointed assistant technical secretary in 1936, technical secretary in 1938, and served as assistant secretary from 1940 to 1944 when he became director of the technical development program.

• • •

John P. McArthur has been appointed manager of West Coast sales, Worthington Pump & Machinery Corp., Harrison, N. J., with headquarters in San Francisco, where he will supervise activities of the Los Angeles, San Francisco, Seattle and Salt Lake City, Utah, district offices. Mr. McArthur, a graduate of Pennsylvania State College, joined the

(*Continued on page* 107)

GEORGE W. CANNON

ROBERT B. POGUE

JOSEPH H. PARSONS

ROSSER L. WILSON

SLY TUMBLING MILLS

THE STANDARD OF STURDINESS

The SLY name on your Tumbling Mills has been the Standard of Sturdiness for many years.

Modern Design Throughout

Anti-Friction Bearings — Direct Motor Drive

Sturdy Construction for

Long Life — Low Maintenance

SLY TUMBLING MILLS
Can be Furnished as Follows:

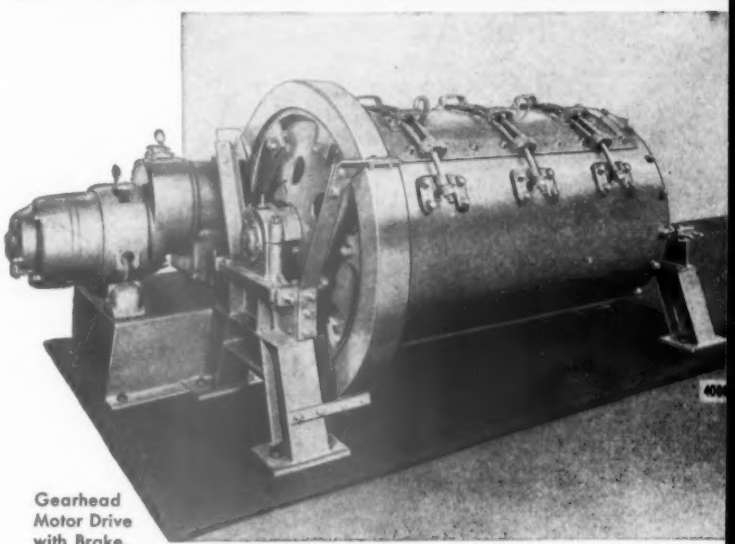
Inside diameters: 24″, 30″, 36″, 42″, and 48″.
Inside length from 36″ up.

Special Designs for

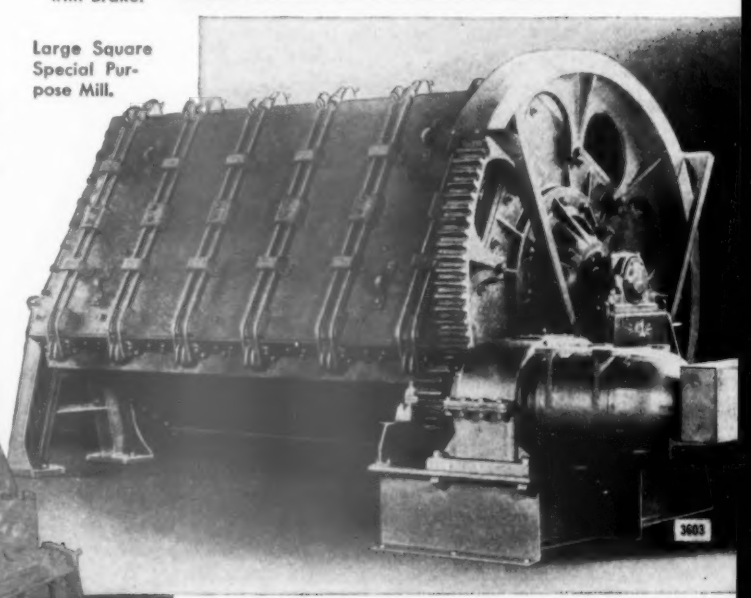
Stove Plate	Sprue Cleaning
Soil Pipe	Welding Rods
Waterpipe Fittings	Cast Anchor Chain

Drives for Mills

For greatest flexibility we recommend individual direct motor drive, but mills can also be furnished with V-belt drive, or tight and loose pulley for flat belt drive.



Gearhead Motor Drive with Brake.



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THE W. W. SLY MANUFACTURING CO.

4753 TRAIN AVENUE • CLEVELAND 2, OHIO

Representatives in New York • Chicago • Philadelphia • Detroit • St. Louis
Toronto • Minneapolis • Cincinnati • Rochester • Los Angeles • Birmingham

A NEW ERA IN THE AMERICAN ECONOMY

There is great promise in the coming decade for those who will take advantage of the tide of progress.

There is considerable hazard in misreading the signs or disregarding the positive trends.

And many foundrymen will need to do some deep thinking and sensible planning for the immediate future.

Wages are high and will stay that way.

If costs stay high volume will be low.

Means toward greater productivity per man hour are available but no panacea exists.

Each plant has individual problems which are practically solvable but each in its own way.

We think there is no better time than right now to put THE HOUSE IN ORDER.

And we feel that we can be of great assistance in securing that desirable end result, a PROFITABLE FOUNDRY.

Large or small undertakings, any part or all of the plant, no matter how difficult the job, are equally interesting and welcome and we want to discuss them with you.

No obligation attaches to any work prior to a formal order.

FRANK D. CAMPBELL

Consulting Engineers

SERVING THE FOUNDRY INDUSTRY

332 SOUTH MICHIGAN AVE., CHICAGO 4, ILLINOIS

Men OF INDUSTRY

(*Continued from page* 104)

company in 1936 as an estimating engineer in the Philadelphia district office; he became a sales engineer two years later, and was appointed manager of the San Francisco district office in 1945.

• • •

Morton I. Dorfan has organized Mechanical Industries Inc., a new engineering company which will specialize in industrial ventilation, smoke, dust and fume control, with headquarters in the Frick Bldg., Pittsburgh 19. Mr. Dorfan, who is president and general manager of the company, has been associated with this field for more than 35 years. For several years he supervised dust control equipment sales, engineering and research activities for American Wheelabrator & Equipment Co., Mishawaka, Ind. Prior to that he served in similar capacities with Allis-Chalmers Mfg. Co., Milwaukee, Pangborn Corp., Hagerstown, Md., and Blaw-Knox Co., Pittsburgh, and as a private consultant to industry.

• • •

James R. Hewitt Jr. has been appointed district representative in Texas and Louisiana for the Foundry Equipment Co., Cleveland, and National Engineering Co., Chicago, with headquarters at 1213 Capitol Ave., Houston, Tex. A graduate of Lehigh University, Mr. Hewitt worked as a metallurgical assistant at the Sparrows Point, Md., plant of Bethlehem Steel Co., between college terms. He was associated with Republic Steel Corp. from 1931 to 1935, when he became foundry metallurgist, American Manganese Steel Division, American Brake Shoe Co. He subsequently was appointed assistant to the vice president and then vice president in charge of operations, supervising general plant operations and plant mechanization programs before and during the recent war.

J. T. Westwood Jr., who is serving as first chairman of the Mo-Kan Chapter of the AFS, is president of Blue Valley Foundry Co., Kansas City, Mo. Mr. Westwood received his early schooling in Independence, Mo. During high school and two years of college he worked after school and during vacations for his father, J. T. Westwood, who had founded Blue Valley Foundry Co. in Kansas City. Upon leaving college he worked there as a squeeze machine molder until 1935, when he became manager of Cushman Foundry, Lincoln, Nebr. In 1939 he returned to Blue Valley Foundry as foundry superintendent and vice president, becoming president upon the death of his father in 1942.

• • •

A. C. Runnette has been appointed manager of sand and permanent-mold casting product sales, Aluminum Co. of America, succeeding **Wiser Brown,** who will devote his full time to activities of the American Magnesium Corp., a subsidiary, of which he is vice president and general manager. Mr. Runnette, who joined the company's sales organization in 1927, has been manager of its jobbing product sales division since 1943. His headquarters will continue to be in Pittsburgh.

• • •

John T. Ramsden has retired as chief engineer, Tabor Mfg. Co., Philadelphia, following 48 years of service with the company. Mr. Ramsden, who is 87 years old, contributed to development of the company's molding machines, many of which he designed himself. From the original hand ram, hand rollover, hand draw machines, he developed the jar ram, power rollover, and power draw machines. He also aided in development of the company's shockless jarring machine, jarring valves, air-on-oil pattern draw, and originated the elastic hand flask clamp. Mr. Ramsden's address is now c/o E. D. Wells, Stony Hill Road, Bethel, Conn.

• • •

J. M. Davies has been appointed director of research, Caterpillar Tractor Co., Peoria, Ill., succeeding **C. G. A. Rosen,** who is recovering from an illness and will act as an advisor to the company in the development of diesel engine design. Mr. Davies, formerly associate director of research, has been succeeded by **Dr. L. A. Blanc,** who has been assistant director of research in charge of the physical, chemical and metallurgical division of the company.

• • •

William A. Marsteller and **Robert P. Melius** have been named vice presidents of Rockwell Mfg. Co., Pittsburgh. For the last several years Mr. Marsteller has been manager of advertising and market research for the company, and vice president of Edward Valves Inc., East Chicago, Ind., subsidiary of Rockwell Mfg. Co. Mr. Melius, who was recently placed in charge of sales for the newly created Power Tool Division of the company, has been sales manager of its Delta Mfg. Division, Milwaukee, since 1935.

• • •

Clyde L. Hassel has been elected president and a director, Pittsburgh Engineering & Machine Co., Pittsburgh, subsidiary of Pittsburgh Steel Foundry Corp., Glassport, Pa. Mr. Hassel will continue as vice president in charge of sales and engineering of the Pittsburgh Steel Foundry Corp.

(*Continued on page* 110)

MORTON I. DORFAN

JAMES R. HEWITT JR.

J. T. WESTWOOD JR.

WHEELABRATOR®
AIRLESS BLAST CLEANING
SAVES $10,104 per year

at the OHIO CULTIVATOR DIVISION of the NATIONAL FARM MACHINERY COOPERATIVE, INC.

BELLEVUE, OHIO

	FORMER METHOD	WHEELABRATOR METHOD	SAVINGS
MACHINE	5 Tumbling Mills	36" x 42" Wheelabrator Tumblast	Per Ton $2.10
PRODUCTION	10 tons in 9 hours	20 tons in 10 hours	Per Day $42.10
LABOR REQUIREMENTS	3 men @ 9 hrs. each 27 man hours	2 men @ 10 hrs. each 20 man hours	Per Month $842.00
CLEANING COST	Per Ton $4.195	Per Ton $2.09	Per Year $10,104.00

DOUBLE THE CASTINGS CLEANED AT NO EXTRA COST

A single Wheelabrator at the Ohio Cultivator Division has cut the per-ton cleaning cost in half. Alone, it cleans 20 tons of castings per day as compared with 10 tons previously handled by 5 tumbling mills.

IMPROVED CONDITION OF WHEELABRATED CASTINGS REDUCES FINISHING COSTS

The Wheelabrator Tumblast quickly removes every semblance of sand and scale with the result that machining and grinding costs have been lowered. Tool life has been greatly increased.

HOW TUMBLAST SAVES

There are two main reasons for cost-reduction with the Wheelabrator Tumblast: (1) It utilizes the Airless Wheelabrator method of blast cleaning, which throws more abrasive and throws it harder per horsepower expended than any other method of blast cleaning known today. Thus, operating and power costs are considerably reduced. (2) It uses the endless conveyor method of Tumbling. This exclusive design completely exposes all surfaces of every piece to the full effect of the abrasive blast. Experience has shown that no other blast mill designed for tumbling work can match its effectiveness.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST

This 36" x 42" WHEELABRATOR TUMBLAST SAVES $42.10 Per Day

The entire daily production of 20 tons of gray iron castings is cleaned in this Wheelabrator Tumblast at the Ohio Cultivator Division. Castings are relatively small, weighing not more than 30 pounds each.

The Wheelabrator Tumblast exposes all surfaces of the castings to clean away every trace of sand and scale.

New informative book gives complete, concise information on all phases of airless blast cleaning. Write today for Catalog No. 74-A.

American

WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit Street — Mishawaka 2, Indiana

Men OF INDUSTRY

(*Continued from page* 107)

along with his new duties with the engineering and machine company. He has been associated with the parent company for over 25 years, serving in production, engineering and sales.

♦ ♦ ♦

John R. Wark, who has been elected chairman of the Western New York Chapter of the AFS for the year 1949-50, is a member of the sales staff of Queen City Sand & Supply Co., Buffalo. Mr. Wark joined the company in 1938, following an association of 15 years with E. J. Woodison Co., Detroit. While serving as branch manager in Woodison Co.'s Buffalo territory, he was one of the organizers and secretary of the Buffalo Chapter of the AFS, which in 1940 changed its name to the Western New York Chapter. A former director of the latter chapter, he served as its vice chairman last year.

♦ ♦ ♦

Vernon H. Patterson, formerly sales metallurgist, American Brake Shoe Co., New York, has joined the development staff of Climax Molybdenum Co., in Detroit. Mr. Patterson is a former chairman of the Rochester Chapter of the American Society for Metals.

♦ ♦ ♦

A. E. Purman has been appointed Michigan representative for Wellman Bronze & Aluminum Co., Cleveland, to handle the sale of the company's magnesium, aluminum and bronze, permanent mold and sand castings and wood and metal patterns. Following graduation from University of Michigan in 1941, Mr. Purman founded his own aluminum and magnesium foundry, which he operated until later that year when he entered military service. Upon discharge from the Army he resumed operations of his foundry until 1948. For the past year he has been engaged in foundry sales work.

♦ ♦ ♦

David M. Warren Jr. has been appointed secretary-treasurer, Eastern Foundry Supplies Inc., Irvington, N. J. Mr. Warren has been engaged as a manufacturers' representative in the Philadelphia area since his release from military service. He succeeds the late Frederick H. Davis who was manager of the Foundrate department, American British Chemical Supplies Inc., New York, which recently appointed Eastern Foundry Supplies Inc. as exclusive sales representatives for its fluxes.

♦ ♦ ♦

Changes have been announced by E. F. Houghton Co., Philadelphia, in its eastern sales division which has been split into two sections. **Orum Kerst,** since 1940 sales representative in New England, will represent the company in the northern section, including New England and New York State, with headquarters in Worcester, Mass. **J. R. Clendenning,** since 1938 sales representative in the Easton-Bethlehem, Pa., territory, has been assigned to the southern section, including Pennsylvania, New Jersey and Delaware, with headquarters in Philadelphia. **A. C. Smith,** formerly assistant to the eastern sales manager, has been named sales co-ordinator for the two eastern sections.

♦ ♦ ♦

Bruce H. Norman has been appointed sales representative in Illinois and Iowa for Black Products Co., Chicago, manufacturer of foundry core compounds and facings. Mr. Norman until recently was general foreman of the Foundry Division, Wilson Foundry & Machine Co., Pontiac Mich. Prior to that he was associated with Caterpillar Tractor Co., Peoria Ill.

♦ ♦ ♦

William C. Baird has been named president and treasurer, Buffalo Pipe & Foundry Corp., Tonawanda, N. Y., manufacturer of cast iron soil pipe and aluminum, brass and bronze castings. Mr. Baird, who has been treasurer of the company since it was founded in 1930, succeeds as president his brother, **Cameron Baird,** who has been elected chairman of the board of directors after serving as president since 1935.

♦ ♦ ♦

R. H. Bacon has been elected president of the Chicago Technical Societies Council for the year 1949-50. Mr. Bacon is vice president of the industrial advertising agency of Kreicker & Meloan Inc., and president of R. H. Bacon & Co., business paper editorial service, of Chicago. He has been active in engineering society work there for 25 years.

♦ ♦ ♦

John C. Toomey has been appointed district sales engineer in the Detroit office, Chain Belt Co., Milwaukee, following a period of special training in the company's products. Mr. Toomey studied mechanical engineering at University of Michigan and has been engaged in sales and application of material handling equipment for 20 years.

♦ ♦ ♦

Harry T. Graham has been appointed assistant general sales manager, General Refractories Co, Philadelphia. Mr. Graham attended University of Florida and George Washington University and spent 3 years as a tax administrator for the government. He has been associated with General Refractories Co. since 1937.

(*Concluded on page* 112)

JOHN R. WARK

VERNON H. PATTERSON

A. E. PURMAN

Everything is worked out for you in the MOGUL Casting Salvage PLAN

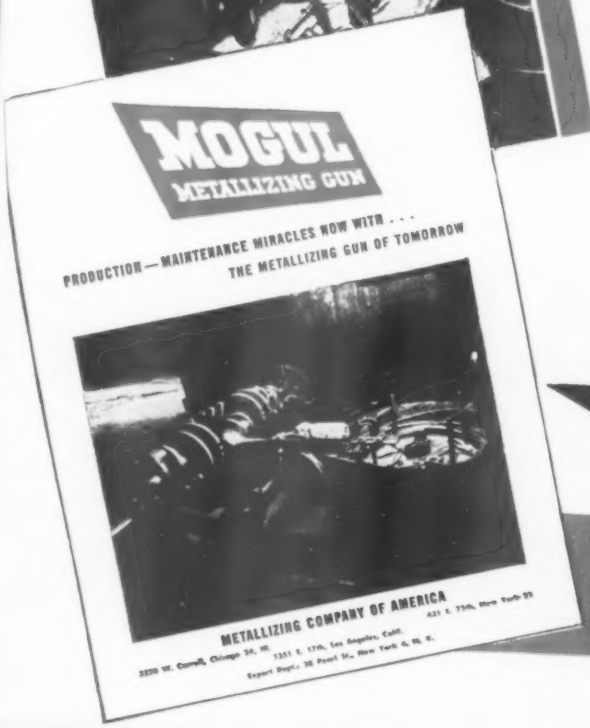
for EXTRA Profits at LESS Cost

LEAKING PRESSURE CASTINGS

Tells you how to efficiently and economically save pressure castings that leak when subjected to air, gas, water and liquids, by impregnating with MOGUL CAST SEAL and equipment.

SURFACE DEFECTS IN CASTINGS

DOT WELDING, a patented process and equipment for efficiently bonding and filling in surface defects in ferrous and nonferrous castings, and adding metal to aluminum patterns and core boxes.



MOGUL METALLIZING PROCESS

An all-important salvage and production method of adding metal on shafts, patterns and castings. Complete information, technical data, and costs.

Write us your problem and we will send you the booklet on the process that will save you money. We have near you an experienced casting reclamation engineer to help you.

METALLIZING COMPANY OF AMERICA

General Offices: 3520 West Carroll Avenue, Chicago 24, Illino

Men OF INDUSTRY

(*Concluded from page* 110)

with the exception of Navy service from 1942-1945. Assigned first to the Chicago sales office, he was transferred to the Philadelphia office in 1946, and the following year became assistant district sales manager of the Pittsburgh office.

♦ ♦ ♦

W. C. Snyder Jr., vice president in the Engineering and Construction Division, Koppers Co., Pittsburgh, has been appointed manager of its metallurgical department. Since joining the company two years ago, Mr. Snyder has been contract manager for the company's activities in Chile, where the division is supervising erection of a steel mill. **Peter V. Martin,** who has been sales manager for the metallurgical department of the division since 1947, has been named assistant manager of the department. **C. A. Kral,** formerly general manager, Newport Steel Corp., Cincinnati, has been appointed special assistant who will go to Chile as Koppers' Chilean management representative.

♦ ♦ ♦

John A. Robinson has been named regional sales manager for the Midwest, Northwest, Rocky Mountain and Pacific Coast areas, Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Philadelphia, with headquarters in Chicago. **Charles E. Sharp,** who has been with the Chicago office the last 5 years, succeeds Mr. Robinson there as branch industrial manager. Both men joined the company at its Philadelphia plant about 20 years ago.

♦ ♦ ♦

Dr. Eugen Sovegjarto has joined the research staff of Eutectic Welding Alloys Corp., New York, which specializes in the development of special electrodes for low and high alloy steels and other specialties of electrodes. Dr. Sovegjarto, formerly employed by leading metallurgical concerns in Germany, will act as consultant and researcher on the research program.

♦ ♦ ♦

Lewis S. Johnson, until recently general superintendent of the foundry, Midvale Co., Philadelphia, has joined Hamilton Foundry & Machine Co., Hamilton, O. Mr. Johnson studied foundry practice and metallurgy at Pennsylvania State College and Temple University. He has served as a member of the Shop Practice Committee of the Alloy Casting Institute since 1946, and as its chairman last year.

♦ ♦ ♦

C. B. Paden has been appointed works manager, Gunite Foundries Corp., Rockford, Ill., producer of

C. B. PADEN

gray iron, malleable iron and steel castings. Mr. Paden joined the company in 1913 and has served in a number of capacities including cleaning room superintendent and general foundry superintendent.

♦ ♦ ♦

T. Max Stanger has been named head of the new Salt Lake City, Utah, sales office recently established by American Wheelabrator & Equipment Corp., Mishawaka, Ind. Mr. Stanger joined the company two years ago as a member of its service engineering staff. Prior to that he was associated with American Foundry & Machine Co., Salt Lake City, and with Pacific Bell Telephone Co.

♦ ♦ ♦

Charles D. Townsend has joined the engineering staff of Associated Engineers Inc., Fort Wayne, Ind. Mr. Townsend, a graduate of North-

C. D. TOWNSEND

eastern University, Boston, until recently was associated with A. B. Chance Co., Centralia, Mo., as chief industrial engineer. His previous experience has been in the building materials, steel tubing, aircraft, powdered metals and pole line hardware fields.

♦ ♦ ♦

O. G. Mandt, president, Jaeger Machine Co., Columbus, O., has resigned, following 23 years of service with the company.

William C. Howard Jr. and **Walter E. Foreman** have been appointed field engineers, Norton Co., Worcester, Mass. Mr. Howard, a graduate of Worcester Polytechnic Institute, has been assigned to the Connecticut territory, with headquarters in Hartford. Mr. Foreman, formerly a member of the sales engineering department at the Worcester plant will work in the Cleveland area.

♦ ♦ ♦

David M. Whyte, until recently head of D. M. Whyte & Associates, Mt. Vernon, O., foundry consultants, has been elected secretary-treasurer and general manager, Bellville Foundries Inc., Bellville, O. Mr. Whyte recently acquired an interest in Bellville Foundries, which specialize in light gray iron and alloy iron castings. He was formerly general foundry superintendent, Cooper-Bessemer Corp., Grove City, Pa., and Mt. Vernon, O.

♦ ♦ ♦

Henry Weber has been appointed general superintendent and production manager of the Fire Weld Division, Cleveland Chain & Mfg. Co., Cleveland. Mr. Weber, who has been associated with the company for over 40 years, was formerly assistant to the late Eli A. Round.

♦ ♦ ♦

W. A. Brown Jr. has been appointed vice president and general manager, the Liquid Carbonic Corp., Chicago. Mr. Brown was formerly vice president of the Compressed Gas Division of the company in New York.

♦ ♦ ♦

P. B. Lowery has been appointed chief metallurgist of the Pontiac Motor Division, General Motors Corp., succeeding the late Zar T. Crittenden. Mr. Lowery, who has been associated with Pontiac since 1922, will be assisted by **A. H. Robinson.**

♦ ♦ ♦

Manley E. Brooks, until recently foundry engineer, Magnesium Alloy Products Co., Compton, Calif., has returned to Dowmetal Foundry, Dow Chemical Co., Bay City, Mich., as technical salesman.

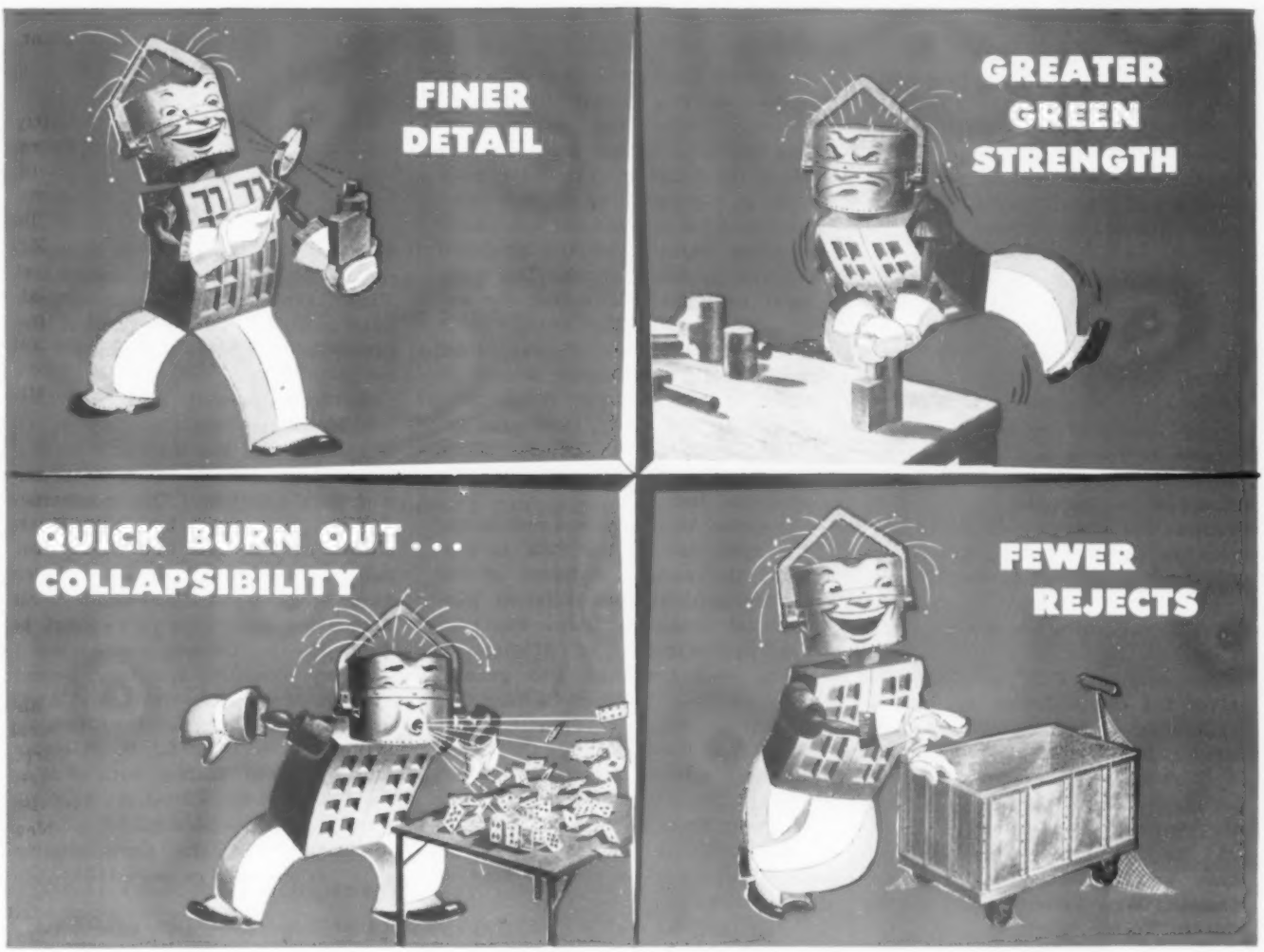
♦ ♦ ♦

Earl Roberts has been appointed sales engineer in the Memphis, Tenn., branch of Black & Decker Mfg. Co., Towson, Md. Mr. Roberts previously worked in the service department in Memphis.

♦ ♦ ♦

Samuel Appelby, formerly associated with W. G. Reichert Engineering Co., Newark, N. J., has left that organization to establish his own business as a foundry consultant.

WHAT EVERY CORE-MAKER NEEDS AND WANTS:



YES — the qualities you need and want are yours in Krause's Cereal Binders—TRUSCOR (light weight) and AMERIKOR (heavy weight).

So why not take advantage of all these benefits by placing your next order with any of the distributors listed below or with us direct.

CHAS. A. KRAUSE MILLING CO., MILWAUKEE 1, WISCONSIN

World's largest dry corn millers

CEREAL BINDERS

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M. A. Bell Co.
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Foundry Supplies Co.,
Chicago 16, Ill.
J. H. Hatten & Son, Aldan,
Delaware Co., Pa.
J. B. Hayes Co.,
Birmingham, Ala.
Independent Foundry Supply
Co., Los Angeles 11, Calif.

Marthens & Co., Moline, Ill.
Carl F. Miller & Co.
Seattle 4, Wash.
Milwaukee Chaplet & Mfg.
Co., Milwaukee 4, Wis.
Pacific Graphite Works
Oakland 8, Calif.

Porter-Warner
Chattanooga 2, Tenn.
Smith-Sharpe Co.
Minneapolis 14, Minn.
Frederic B. Stevens, Inc.
Buffalo 12, N. Y.
Frederic B. Stevens, Inc.
Cleveland 14, Ohio

Frederic B. Stevens, Inc.
Detroit 26, Mich.
Frederic B. Stevens, Inc.
New Haven 11, Conn.
Western Industrial Supply Co.
Portland 14, Ore.

FOUNDRY EDUCATIONAL FOUNDATION

Opens Campaign for $400,000

AN industry-wide campaign has been opened by the Foundry Educational Foundation to raise $400,000 required to support its expanded program during the three years starting next May 1. The first two of a series of 23 local campaign meetings were held late in September, and these meetings will continue the ensuing three months to embrace all of the leading foundry districts of the Middle West, East and South.

With the FEF approaching completion of its first three years of operation, the success experienced in its aim to foster and improve education in foundry engineering has prompted the proposal not only to continue but also to enlarge its program, so as to more completely and effectively reach engineering schools located in those areas where the heaviest concentration of foundries exists.

The original FEF program involved the establishment of foundry engineering courses, scholarships and foundry facilities at Case Institute of Technology, Cleveland; Cornell University, Ithaca, N. Y.; University of Cincinnati; Massachusetts Institute of Technology, Cambridge, Mass., and University of Wisconsin, Madison, Wis. Subsequently, Northwestern Technological Institute, Evanston, Ill., and more recently the University of Alabama, University, Ala., became foundation schools.

Funds from the current campaign will permit the extension of FEF activities to five more engineering schools. Unlike the expenditures from the fund set up on the inception of the foundation, however, none of the money raised by the new campaign will be required for equipment or other facilities at the proposed five new member schools. The additional institutions proposed for entrance into the FEF next May 1 are: Michigan State College, East Lansing, Mich.; Missouri School of Mines and Metallurgy, Rolla, Mo.; Ohio State University, Columbus, O.; Pennsylvania State College, State College, Pa., and Purdue University, Lafayette, Ind.

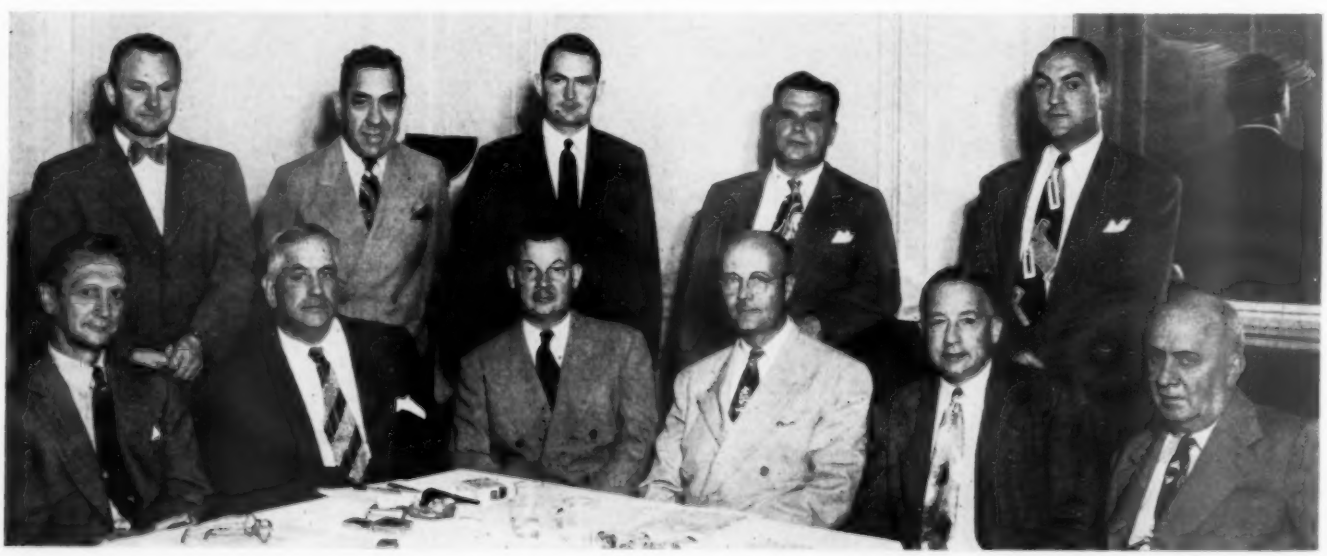
A special campaign committee has been appointed by the FEF to represent the various divisions of the foundry industry and different geographical areas, all under the general chairmanship of Homer F. Tielke, vice president and general manager, Crucible Steel Casting Co., Cleveland. Thomas H. Shartle, president, Texas Steel Castings Co., heads the steel castings section, with F. Kermit Donaldson, executive vice president, Steel Founders' Society of America, as co-chairman. John M. Price, president, Ferro Machine & Foundry Co., Cleveland, is chairman of the gray iron section, assisted by Frank O'Malley of the same company and R. L. Collier, executive vice president, Gray Iron Founders' Society.

Anthony Haswell, president, Dayton Malleable Iron Co., Dayton, O., is chairman of the malleable section, assisted by Lowell Ryan, Malleable Founders' Society. The nonferrous section is headed by William A. Gluntz as chairman and David Kennedy, both of Gluntz Brass & Aluminum Foundry Co., Cleveland. C. B. Schneible, president, Claude B. Schneible Co., Detroit, and Arthur J. Tuscany, executive secretary, Foundry Equipment Manufacturers Association, will direct the foundry equipment section. L. P. Robinson and Warner B. Bishop, both of Werner G. Smith Co., Cleveland, head the foundry supplies section.

Chairmen of the three district

(*Concluded on page* 116)

Preparing for the FEF $400,000 campaign is this group recently assembled in Cleveland. Seated, left to right: Anthony M. Haswell, Claude B. Schneible, F. Kermit Donaldson, Homer F. Tielke, campaign chairman, L. P. Robinson, John M. Price. Standing: George K. Dreher, executive director, Arthur J. Tuscany, Warner Bishop, Ray L. Collier, Frank O'Malley



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IN CONSTRUCTION— SKIL Tools are tops . . . oversize bearings and extra-powerful motors for smooth, efficient, long-lasting service.

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Ask your SKIL Tool Distributor to demonstrate SKIL 3-Phase Grinder and SKIL Disc Sanders on your own work. Call him today . . . you'll be glad you did!

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SKIL Disc Sanders
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There's new, greater powe in these SKIL Disc Sanders . to speed your rough finishin jobs with cup grinding wheel SKIL Disc Sanders are ligh compact, perfectly balance . . . easy to use anywhere Ask your SKIL Tool Distributo to recommend the right SK Disc Sander for your surfac ing jobs. 3 Powerful Model

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(*Concluded from page* 114)

groups, under whom 11 divisions will operate, include: Middle West, Duncan P. Forbes, president, Gunite Foundries Inc., Rockford, Ill.; East, J. A. Sauer, Symington-Gould Corp., Rochester, N. Y.; and South, L. N. Shannon, vice president, Stockham Valves & Fittings Inc., Birmingham.

Opening campaign meetings held Sept. 27 at Minneapolis and Sept. 30 at Rockford, Ill., will be followed by a meeting Oct. 4 at Rock Island and Oct. 7 at Peoria, Ill. Other meetings this month will include St. Louis Oct. 11, Indianapolis Oct. 14, Chicago Oct. 20, Milwaukee Oct. 24, Muskegon, Mich., Oct. 26 and Detroit Oct. 31.

Next month's schedule is as follows: Cleveland Nov. 2, Erie, Pa., Nov. 4, Buffalo Nov. 8, Syracuse Nov. 10, Boston Nov. 15, Bridgeport Nov. 17, New York Nov. 22, Philadelphia Nov. 29. Concluding meetings will be at Baltimore Dec. 1, Pittsburgh Dec. 7, Columbus, O., Dec. 12, Cincinnati Dec. 15 and Birmingham Dec. 21.

Book Review

Dizionario Tecnico, by Dott. Ing. Giorgio Marolli, cloth, 630 pages, published by Felice Le Monnier, Florence, Italy.

This is the second edition of a 50,000-word English and Italian technical dictionary. The number of words in this edition pertaining to chemical, aeronautical, naval, radio, textile and building phases of engineering has been increased. As a supplement to the dictionary, the author has included in both languages explanations of a large number of technical terms together with notes on their use. There are in addition, 16 drawings relating to automotive, aircraft, marine, railway, radio and chemical construction and engineering with lists of Italian and English terms describing them.

Plan Symposium On Air Pollution

A national symposium on air pollution, presented by Stanford Research Institute in co-operation with California Institute of Technology, University of California and University of Southern California, will be held Nov. 10-11 at Huntington Hotel Pasadena, Calif. Scientists, engineers and other technical personnel in the field of air polution will participate. Program includes presentation of papers and interchange of ideas and methods of analysis and control of air pollution, a pressing problem at present.

Nonferrous Melting

With Induction Lift Coil Furnaces

(*Continued from page* 77)

Some of the units are permanently connected to bus bars and others are tied in by means of contactors in order that corrective capacity may be varied from the control panel to meet various furnace conditions.

Accuracy with which results may be reproduced is limited only by materials charged, and the speed of melting is so rapid that the amount of material lost through oxidation or contamination is inconsequential. The inherent stirring caused by the electromagnetic action tends to eliminate or prevent segregation and promotes complete and uniform alloying.

Fast melting results from the ability to concentrate large amounts of power in relatively small charges and from the fact that it is not necessary to heat a large quantity of refractory material. With this type of melting the energy used for heating is induced directly into the metal which, in turn, becomes the hottest part. The only heat losses are those due to the conduction from the melt to the crucible, radiation from the surface of the melt exposed to the atmosphere and the electrical losses.

Rate of melting is directly proportional to the output of the generator and the weight of charge being melted. Since the charge heats the crucible, the latter and the refractories will receive little punishment. Consequently long crucible life is experienced and refractory maintenance is minimized. We have found that a glazed type crucible almost invariably will produce 75 heats. Radiation losses are also minimized as lower temperatures are encountered on the radiating surfaces. Temperature is controlled by varying the power input and as a result the metal may be melted slowly, rapidly or held within an established range.

The operation is efficient and is suited for production where alloys of an exact or fussy nature are required; where a variety of alloys are desired; where a large number of relatively small heats are necessary, or where it is not desired to maintain a heel of molten metal in a furnace over an entire work day or over nonproductive periods. This type of melting enables the operators to pour an entire charge and shut the furnace down completely between heats. Power is required only when melting as no maintenance or temperature is necessary, thus reducing the overall cost of the melting operation.

Flexibility is obtained with the lift coil type of induction melting furnace since a change from the melting of one alloy to another means merely the substitution of a crucible.

Maintenance is minimized as the furnaces and generators are of simple, rugged construction. Refractories are easily replaced when required and the motor generator sets give good service and have long life. Electrical load characteristics are considered to be good as the power drawn from the mains is steady and has a high power factor.

Working conditions are excellent as a minimum of heat is encountered around the furnace. The inductor coil is water cooled and no heat is radiated from the sides of the furnace box. The furnaces are easy to keep clean and promote cleanliness in the surroundings. They are safe to work with and around, as danger of being burned is minimized and adequate protection against electrical shock is provided.

Produce Clean Metal

Metal produced has been found to be exceptionally clean and free of inclusions and trapped gases. Fluxing has been practically eliminated. At present our practice is to use only a light charcoal cover to minimize oxidation at the surface exposed to the atmosphere.

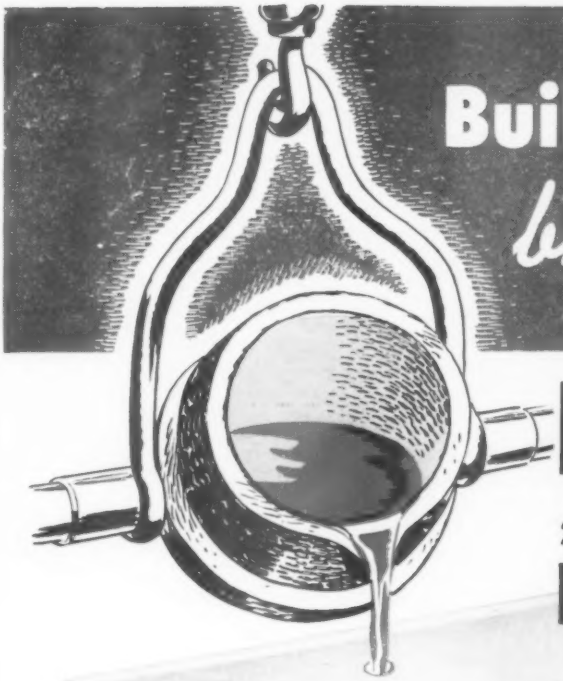
Operation of the furnace is simple and easily understood. The few items requiring attention are grouped on the control panel and are easily adjusted to meet melting conditions. Operators quickly acquire the knack of controlling and operating the equipment.

The primary objection to the use of this type of melting appears to be in its high initial cost. The electrical parts are expensive and this tends to limit use of the equipment to the more cirtical or costly alloys.

It has been found that a somewhat higher temperature must be obtained before pouring in order to compensate for the heat loss by conduction to the crucible. This is due to the fact that the crucible, especially the low-conductivity type, does not become as hot as the metal, and a chilling effect is apparent, particularly in the last part of the metal to be poured over the cooler wall. This factor may prove to be detrimental if not properly compensated.

Melting speeds do not vary appreciably with the size of the crucible

(*Continued on page* 119)



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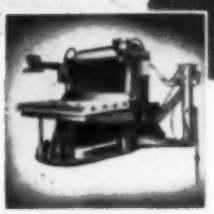
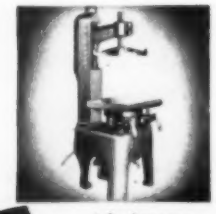


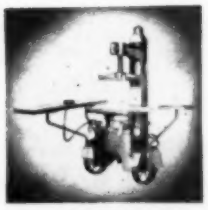
Jolt Rollover Draw, Model A

Jolt Rollover Draw, Model SA

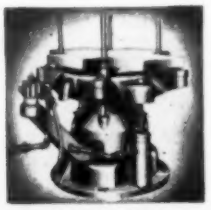


Jolt Squeeze, Model 10-JX (stationary)

OVER 60 SIZES to meet your requirements



Jolt Squeeze, Model 10-JX (portable)



Jolt Pin Lift Model AJS (stationary)

Jolt Pin Lift, Model AJS (portable)

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(*Continued from page* 116)

or weight of the charge. Larger heats take longer to melt, but the output per hour tends to remain about constant over the usual recommended ranges.

Melting speed does vary with the type of charge and the thermal characteristics of its constituents. The 175-kw unit is rated at 1000 lb of red brass per hour but our particular alloys average from approximately 960 to 1280 lb per hour, with some alloys such as aluminum bronze being a little slower.

Actual figures indicate that the 175-kw unit will melt a 150-lb charge in 15 to 20 minutes at each station, depending upon the condition of the charge and the alloy being melted. This gives us a capacity of 480 to 640 lb per hour at each station or a total of 960 to 1280 lb per hour or 16 to 21 lb per minute.

The 100-kw unit is rated at 525 lb of red brass per hour. Actual figures indicate that we produce a 160-lb charge of our alloys in 15 to 20 minutes, depending upon the condition of the charge and the alloy being melted, giving us a capacity of 480 to 640 lb per hour, or 8 to 11 lb per minute.

Since power costs of operating this type of equipment vary with power rates in different localities, a better basis for comparison would be the amount of current required per heat. We have made an analysis of the current requirements for both the 100-kw and 175-kw units melting a 160-lb heat of manganese bronze, which is a material that has an average melting rate, and have obtained the following figures.

With the 100-kw unit the current consumption (using average figures) and operating data based on power input to the motor were as follows:

CURRENT CONSUMPTION, 100-KW UNIT	
Volts	460
Kilowatts	119
Amperes	187
Power factor	80%
Melting time	21 minutes
Kwhr	40
Kwhr per 100 lb.	25
Load factor	72%

Operating data for melting the same type of heat with the 175-kw unit were as follows:

CURRENT CONSUMPTION, 175-KW UNIT	
Volts	460 volts
Kilowatts	122
Amperes	180
Power factor	85%
Melting time	17 minutes
Kwhr	34.5
Kwhr per 100 lb.	21.6
Load factor	76.5%

In order to determine actual melting costs a power cost averaging $0.01 per kwh may be assumed. At this rate the melting cost would be $5 per ton when using the 100-kw unit and $4.32 per ton when using the 175-kw or much larger unit.

The measurement of metal temperature can be accomplished in much the same manner when using induction melting as when using other methods. The electromagnetic field has little effect upon the relatively fine wire which is used in thermocouples, and an open end, immersion type of couple can be used successfully. Various types of shields or tubes can be used to protect the thermocouple if the open end is not used. A ceramic type of nonconducting material can be used successfully in many instances. Metal tubes can also be used, but they should be removed from the crucible during the meltdown state as they tend to heat

(*Concluded on page* 122)

Benefits Cited from Visual Aid Programs

PROGRESSIVE steps are being taken to conserve sight in industry, according to a report by American Optical Co., Southbridge, Mass. Over 2 million workers—10 per cent of the nation's industrial workers—are now receiving the benefits of vision aid programs installed by leading manufacturing plants. Analysis of reports received from these plants indicates that one out of every three factory workers, on an average, needed eyesight correction. Adoption of industrial safety and visual efficiency programs has resulted in reduced eye and other accidents and saving of thousands of dollars in medical and compensation costs.

American Optical Co. developed a portable sight-screening instrument, shown in the accompanying illustration, which can be utilized anywhere in a plant to check 14 important visual functions in a few minutes. If the check indicates need for visual care, employees are advised to seek professional attention. In addition, workers on eye-hazardous jobs are provided safety goggles, and if vision is deficient, with prescription safety goggles.

Other features of the program include establishment of eye protection standards, a program for fitting and maintaining eye protection devices, and recommendations for improvement of environmental conditions affecting vision, such as correct illumination, elimination of glare and other means for increasing visual perception.

Citing a typical report on value of the programs, Hughes Tool Co., Houston, Tex., stated that 726 employees had been fitted with prescription safety goggles. It was estimated that $12,000 in compensation, plus about $3000 in medical and hospital expense, had been saved, taking into consideration the six eyes that were believed to have been saved.

At the Crompton & Knowles Loom Works, Worcester, Mass., 2650 employes were given a vision check. Of these, nearly 22 per cent were referred to their own physicians for eye examinations. The company discovered that protective goggles actually helped to make employees safer workers, and estimated a 54 per cent decrease in accidents other than eye injuries. These included contusions, abrasions and minor lacerations.

Caterpillar Tractor Co., Peoria, Ill., reported the screening of 5688 employees in 1947. Of these, 1265 were found to have "unsatisfactory" vision, and were advised to seek professional care.

For Better Results at Higher Temperatures in Chemical Processes: Pure Oxide Refractories

In its continuous search for refractory products which can be used at higher and higher temperatures, Norton Company has developed a line of pure oxide refractories.

As the term "pure oxide" refractories implies, the raw materials from which the product is made are carefully selected as to source and composition. Raw materials of higher melting points have been searched for and found.

The objective is to mold articles which will contain an absolute minimum of addition agents for bonding purposes and to fire the shapes at sufficiently high temperatures to produce a truly sintered final product.

A variety of pure oxide products have now been developed and successfully used in the field. These include bricks of the 9'' and other standard series, large furnace shapes and small furnace shapes and laboratory ware.

The principal raw materials used in the manufacture of Norton pure oxide refractories are Alundum (fused alumina), Magnorite (fused magnesia), fused stabilized zirconia and, to a limited degree, fused thoria.

fused alumina: Alundum

Norton 38 Alundum is used in the manufacture of pure oxide refractories and these shapes contain 99+% Al_2O_3. The melting point is approximately 2000° C. This is an inert substance and the refractory shapes are resistant to chemically active solutions. The shapes are strong, true to size and shape, extremely refractory and with high electrical resistance. Three grades of Alundum pure oxide refractories are available: dense, insulating and impervious.

fused magnesia: Magnorite

Magnorite refractories are made from selected magnesite which is MgO in its densest form. This is a basic refractory material. Magnorite shapes are used largely in lining metal melting furnaces, both ferrous and non-ferrous.

fused stabilized zirconia

This is electrically fused zirconia (ZrO_2) stabilized by CaO to prevent inversions. Two grades are available, a dense grade and an insulating grade. Stabilized zirconia can be used at extremely high temperatures; it is an excellent thermal insulator and it is relatively inert. It does become an electrical conductor at high temperatures. Because of its unusual refractory properties, stabilized zirconia has made possible a number of new manufacturing processes.

fused thoria

Electrically fused thoria (ThO_2) is manufactured in the form of grain and small refractory shapes. This is the most inert of all refractory materials and has the highest melting point (3050° C.) of all the oxides. There are two limitations to its use: it is radioactive and it is very expensive.

grain

High purity Alundum, Magnorite and stabilized zirconia are also available in the form of grain for use as a raw manufacturing material or for thermal insulation. Alundum and stabilized zirconia can be used in either oxidizing or reducing atmospheres. Grains of both high and low thermal conductivity make it possible to control heat loss. The unusually low heat thermal conductivity of stabilized zirconia insulating grain recommends its use when heat saving is a necessity. Its conductivity is similar to the best fire clay insulating material although it can be used at more than twice the temperature.

pure oxide refractories

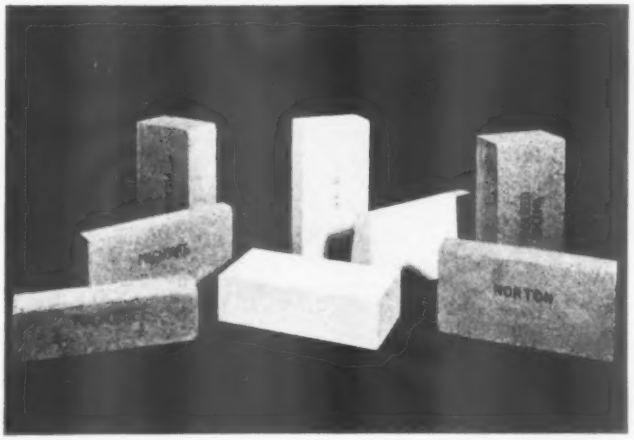
	Alundum			Magnorite	Stabilized Zirconia	
	Dense	Insulating	Impervious	Dense	Dense	Insulating
composition Al_2O_3 MgO ZrO_2(+CaO)	99%	99%	98+%	97+%	98%	98%
specific gravity	3.1	1.9	3.7	2.8	4.2	2.8
porosity	22%	53%	7%	21%	25%	50%
thermal conductivity at 2000° F. btu/hr./sq. ft., in./° F.	17	9	estimated 30	12	6	4
melting point	2000° C.	2000° C.	2000° C.	2700° C.	2650° C.	2650° C.
top use temperature*	1950° C.	1850° C.	1900° C.	2300° C.	2500° C.	2000° C.

*Top use temperature depends on application. Temperatures quoted are maximums encountered to date.

NORTON® **Norton Company • Worcester 6, Mass.**

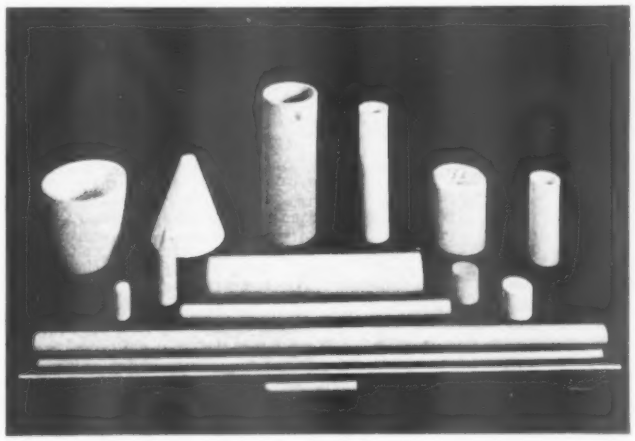
heavy shapes

Industry is continually reaching for new materials, as they make visible new manufacturing horizons. Alundum, Magnorite and stabilized zirconia refractories are serving these needs by their resistance to extremely high temperatures. Standard and special shapes are supplied of Alundum, Magnorite and stabilized zirconia to satisfy most all construction requirements. Blocks, circle brick, hearth plates, rails, muffles, thermocouple blocks, weighing as much as 320 pounds, have been supplied.



bricks

High purity Magnorite, Alundum and stabilized zirconia are available in most brick and special shapes with a variety of physical properties. The high thermal conductivity of dense Alundum makes it ideal for heat transmission. Insulating Alundum, however, is an excellent thermal insulator even at temperatures well above that possible with other thermal insulating materials. Magnesia refractories have the reputation of having low load bearing strength at elevated temperatures. Norton high purity Magnorite, however, has greater load bearing strength than any other known refractory.



laboratory ware

Norton Alundum Laboratory Ware is being used by the ceramist, metallurgist, chemist, glass technologist, and technologists of widely different fields. The high resistance to metal pick-up and high resistance to fusion make them suitable for many severe chemical and thermal applications. Pyrometer tubes and combustion tubes mean longer life and wider operating temperature ranges.

Magnorite and stabilized zirconia ware are not available in all of these shapes and are not impervious. However, they have proved excellent for many applications where this property is of minor importance.

Can't be beat for handling heat!

NORTON®
REFRACTORIES

(*Concluded from page* 119)

differentially with the charged material and may melt before the charge becomes liquid. However, if they are immersed in the molten charge, the metal surrounding the tube tends to shield it from the action of the field and the heating effect is obtained by conduction of the liquid metal.

Other types of temperature measuring devices such as optical pyrometers or Rayo-tubes can be used wherever feasible and must, of course, be used when alloys having high melting temperatures are being processed.

We have been thoroughly convinced that the high-frequency induction melting furnace is the last word in melting equipment. Both supervision and operators are thoroughly sold on the equipment and it would be almost impossible to convince them otherwise. The operators in particular take great pride in those installations we now have, so much so in fact that the equipment is kept in the best shape both from an operating standpoint and from a cleanliness point of view. The simplicity of operation, flexibility, accuracy of reproduction, quality of product, rate of melting, and the accompanying working conditions have made it an extremely useful and admired tool in our foundry practice.

Operating Costs of Cranes, Shovels

Power Crane & Shovels Association has published an operating cost guide to aid owners of power cranes and shovels in estimating cost of ownership, operation and maintenance of such equipment. Copies of the pamphlet may be bought for 50 cents each from the association, 74 Trinity Place, New York 6. Complimentary copies will be furnished to engineering schools and colleges.

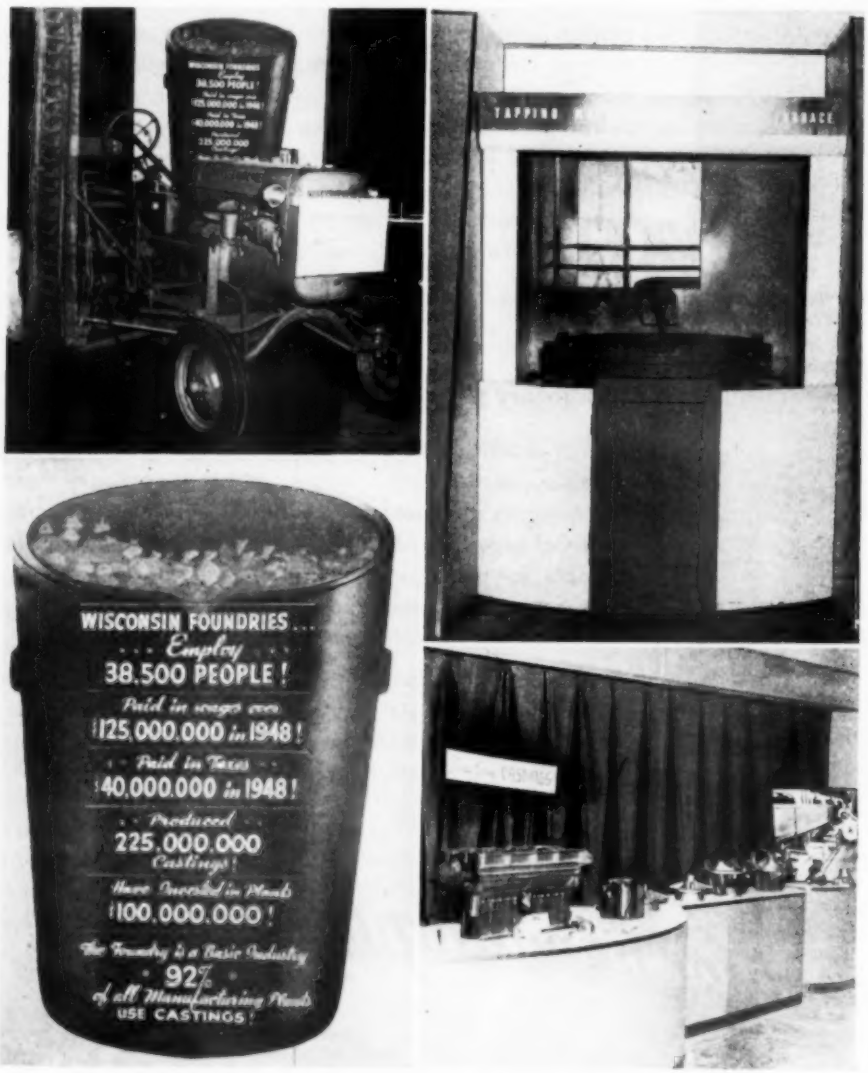


EXHIBIT: Views of the foundry industry exhibit displayed at the Wisconsin State Fair held this summer at Milwaukee. Photos by Walter V. Napp, Badger Firebrick & Supply Co.

AFS Conference at Stevens Institute

Metropolitian, Philadelphia and Chesapeake Chapters of the American Foundrymen's Society are joining with the Stevens Institute of Technology, Hoboken, N. J., in conducting regional foundry conference to be held at the institute, Oct. 21-22. Both ferrous and nonferrous foundry practice will be covered by the extensive program anounced for the conference and detailed here.

Harold L. Ullrich, Sacks-Barlow Foundries Inc., Newark, N. J., is general chairman of the conference, assisted by the following committee chairmen: Arrangements, Frank B. Eliason, Pennsylvania Foundry Supply & Sand Co., Philadelphia; Program, John A. Bukawsko, Worthington Pump & Machinery Corp., Harrison, N. J.; Registration, Howard Williams, New Jersey Silica Sand Co., Millville, N. J.; Finance, Robert Maddison, Whitehead Bros. Co., New York; Reception, H. A. Robinson, Repubic Steel Corp., New York; Publicity, George Baer, Atlas Foundry Co., Irvington, N. J.

Friday, Oct. 21

9 a.m.—Registration

9:30 a.m.—Conference called to order by Harold L. Ullrich, general conference chairman

10 a.m.—Address of welcome by Dr. Harvey N. Davis, president, Stevens Institute of Technology

10:30 a.m.—Round-table Discussion on "Gating and Risering." Steel—chairman, E. C. Troy; Gray Iron—chairman, Harry Kessler, Sorbo-Mat, Process Engineers, St. Louis; Nonferrous Alloys—chairman, Herbert Brecht, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.

12 noon—Luncheon at Stevens Institute

2-3:30 p.m.—Gray Iron: "Carbon Control in Casting Iron," technical chairman, R. A. Flynn, American Brake Shoe Co., Mahwah, N. J. Speaker, Fred Hanson, Electro Metallurgical Division, Union Carbide & Carbon Corp., New York.

Nonferrous: "Nonferrous Foundry Practice," technical chairman, Earl Bush, U. S. Naval Gun Factory, Washington. Speaker, C. A. Robeck, Gibson & Kirk Co., Baltimore.

Steel: "Microstructure and Mechanical Properties of Cast Steels," technical chairman, Clyde Jenni, General Steel Castings Co., Eddystone, Pa. Speaker, Malcolm F. Hawkes, Carnegie Institute of Technology, Schenley Park, Pittsburgh.

3:30-5 p.m. Gray Iron and Malleable: "New Trends in Core Binders," technical chairman, George Watson, American Brake Co., Mahwah, N. J. Speaker, Joseph A. Gitzen, Delta Oil Products Co., Milwaukee.

Nonferrous: "Recent Progress and Application of Plaster Mold Composition for Use with Nonferrous Castings," technical chairman, B. A. Miller, Baldwin Locomotive Works, Foundry Division, Eddystone, Pa. Speaker, K. A. Miericke, U. S. Gypsum Co., Chicago.

Steel: "Steel Foundry Sands and Their Relation to Casting Defects," technical chairman, Edward H. Berry, Dodge Steel Co., Philadelphia. Speaker, Howard F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

Saturday, Oct. 22

9:30 a.m. "Fluid Flow in Transparent Molds," technical chairman, William B. Morley, Olney Foundry Division, Link-Belt Co., Philadelphia. Speaker, L. W. Eastwood, Battelle Memorial Institute, Columbus, O.

10:30 a.m. "Ductile Cast Iron," technical chairman, Harold L. Ullrich, works manager, Sacks-Barlow Foundries Inc., Newark, N. J. Speaker, William C. Mearns, International Nickel Co., New York.

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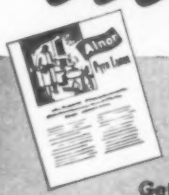

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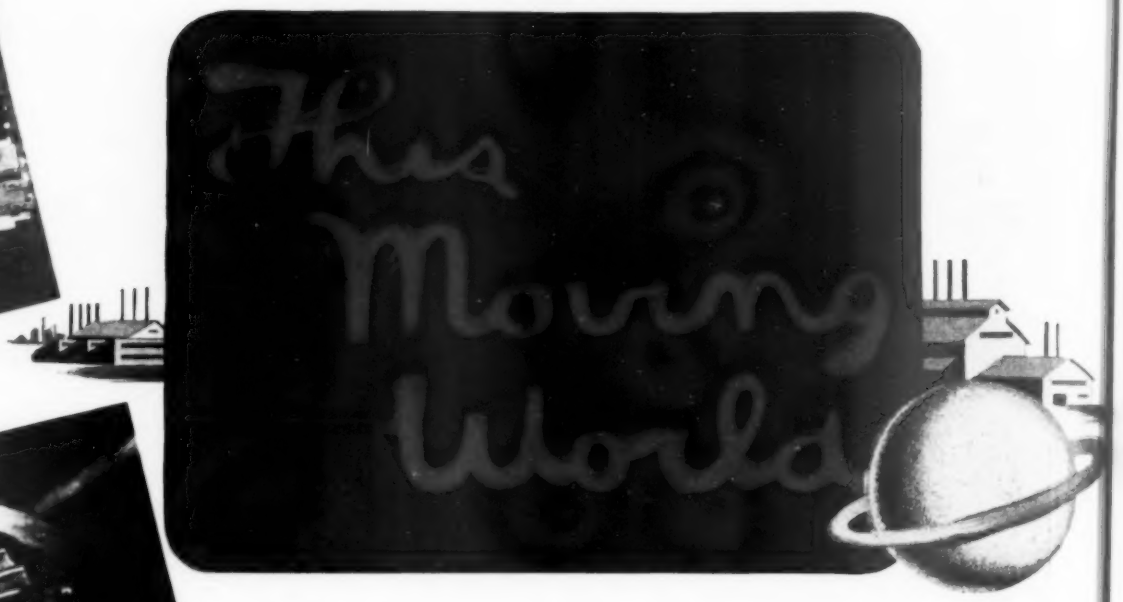
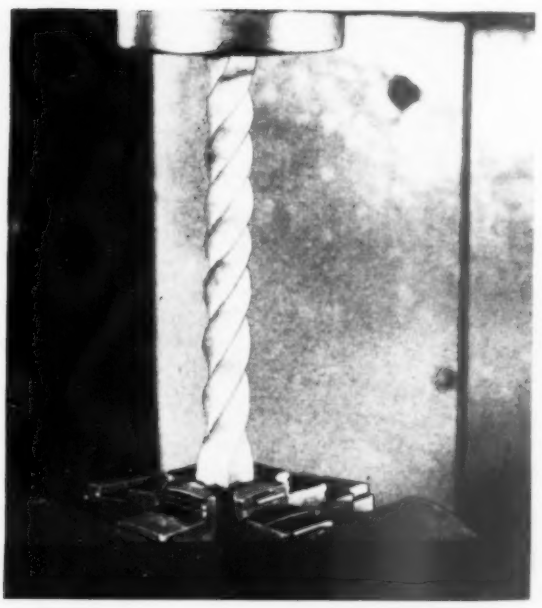
Malleable iron castings, their properties, applications and method of production, are dramatically described in the Malleable Founders' Society new motion picture

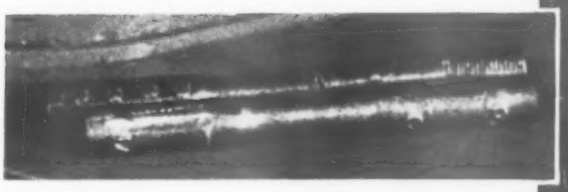


THE story of American malleable iron is told in an interesting and dramatic manner in a new motion picture introduced recently by the Malleable Founders' Society, Cleveland. The film, produced by Roland Reed Productions of Beverly Hills, Calif., at a cost of nearly $75,000, is in technicolor; Edwin C. Hill is the narrator.

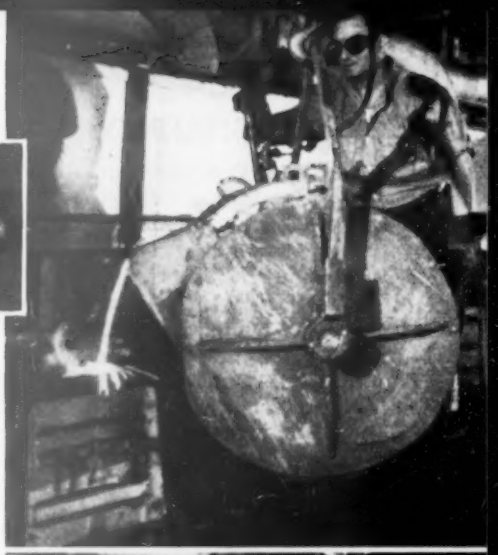
In thirty-minutes' running time the film shows enough of the technique of the production of malleable iron



Numerous applications of malleable iron castings are depicted. Above are two actual views on automotive assembly lines. Twisting a test bar to illustrate the metal's malleability is shown at right



Right — Showing elongation experienced by malleable iron test bar prior to rupture



castings to give the observer a concise but clear picture as to how malleable iron is made and also emphasizes the important part played by malleable as a component part in the manufacture of automobiles, railroad cars and farm implements, also the use of malleable in the production of chain, plumbing and electrical fittings and parts.

The picture is entitled "This Moving World," and takes for its theme the importance of malleable in today's era of motion and speed. Illustrations of the impact and shock resistance of malleable, its easy machinability, its resistance to corrosion, and its other important characteristics are depicted. A few of the many scenes from the film are shown in the accompanying illustrations.

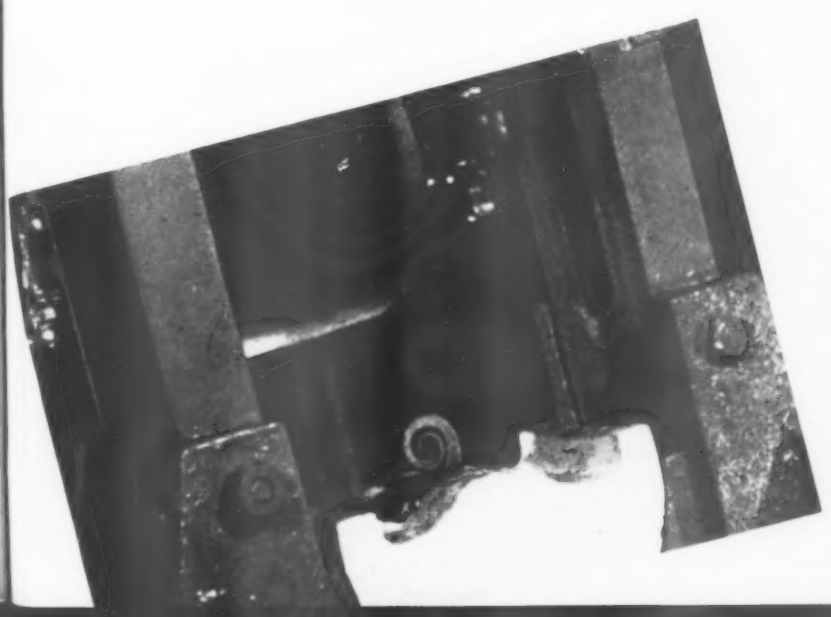
The Malleable Founders' Society produced the movie on behalf of the industry as a means of showing engineers, engineering students, technical societies and the general public something of the story of how malleable is made and its application. Actual production of the movie was supervised by a committee of which Frank O. Parker, vice president in charge of sales, Dayton Malleable Iron Co., Dayton, Ohio, is chairman.

Other members on the committee were: C. S. Anderson, president, the Belle City Malleable Iron Company, Racine, Wis.; George E. Bean, managing director, the Eastern Malleable Iron Co., Wilmington, Del.; D. L. Boyes, director of sales, Central Foundry Division, General Motors Corp., Saginaw, Mich.; Cal C. Chambers, president, Texas Foundries Inc., Lufkin, Tex.; R. J. LaMarche, secretary, the American Malleable Castings Co., Marion, O., and P. H. Vincent, vice president and general manager, the Erie Malleable Iron Co., Erie, Pa. James H. Lansing, technical and research director of the society, served as a staff consultant to the committee and had an active part in the supervision of production.

At a premiere showing of the picture in Cleveland, James H. Smith, general manager of Central Foundry Division, General Motors Corp., Saginaw, Mich., and president of the society, announced that an active campaign would be undertaken to have the movie shown throughout the country to all groups interested in seeing it.

Mr. Parker announced that several copies of the film would be available for distribution by the Malleable Founders' Society and that most of the member companies would have their own copies for showing in the areas in which they are located.

Inquiries from groups interested in seeing the film should be addressed to Malleable Founders' Society, 1800 Union Commerce Building, Cleveland 14.



OBITUARY

DONALD C. BAKEWELL, 61, vice president in charge of sales, Blaw-Knox Co., Pittsburgh, died Sept. 10. A graduate of Yale University, Mr. Bakewell had two years of graduate work in mechanical engineering at Massachusetts Institute of Technology. He was president, Duquesne Steel Foundry Co., Pittsburgh, from 1917 to 1930, following which he was vice president of the merged successor company, Continental Roll & Steel Foundry. He joined Blaw-Knox Co. in 1937, and in addition to

DONALD C. BAKEWELL

being sales vice president he was a director and member of its executive committee. Mr. Bakewell was a past president of the National Foundry Association and the Steel Founders' Society of America.

* * *

F. P. Wilson, 79, a past president of the Institute of British Foundrymen, died July 28. Mr. Wilson was educated in the Middlesbrough schools and learned his trade as an engineering apprentice at the Tees-side Engine Works of R. Stephenson & Co. Later he became foundry manager, Pease & Partners Ltd., Middlesbrough. He presided over the Institute of British Foundrymen in 1930, and was one of the founders of its Middlesbrough Branch.

* * *

P. E. Peterson, 74, foundry instructor at Wentworth Institute, Boston, for 34 years, died June 9 in that city after a long illness. Born in Indianapolis he was taken as a child to Minneapolis where he had a grade school education and where later he served an apprenticeship in a foundry. After working several years as a journeyman molder he was appointed instructor in foundry practice at the University of Minnesota in 1905. In 1915 he went to Wentworth Institute in the same capacity. He enjoyed an enviable reputation as an instructor and a wide acquaintance in foundry circles, due in part to the favorable impression he made on the thousands of boys who attended his classes.

* * *

William Newlands, 59, for the past 4 years superintendent, New England Butt Co., Providence, R. I., died Aug. 27. Mr. Newlands was born in Scotland and came to the United States in 1912. He was associated previously with American Engineering Co., Philadelphia, for 10 years, Spring City Foundry & Machine Co., Spring City, Pa., and Chambersburg Engineering Co., Chambersburg, Pa.

* * *

Harry S. Carter, 60, vice president, New York Car Wheel Co., Buffalo, died there Aug. 7. Mr. Carter joined the company in 1905, and six years later moved to Toronto, Ont., where he founded the H. S. Carter Co., railroad supplies. He sold the business in 1916 and rejoined the New York Car Wheel Co., becoming its vice president last year.

* * *

William G. Conant, 47, Scotia, N. Y. head of metallurgical development section of General Electric Co.'s laboratory in Schenectady, N. Y., died Aug. 29, following a heart attack. Mr. Conant, known for his work in the fields of metallography, radiography and welding, pioneered in the use of X-ray for industrial purposes.

* * *

William G. Nichols, 87, former president of the Cox Foundry & Machine Co., Atlanta, died Aug. 9, following a long illness. A native of Merrimac, Mass., he had lived in Georgia for the past 40 years. He had previously been vice president and general manager of the Griffin Mfg. Co., Griffin, Ga.

* * *

Wilbur B. Driver, 75, founder of two metal manufacturing companies, died in Orange, N. J., Aug. 23. Mr. Driver founded Driver-Harris Co., Harrison, N. J., in 1900, and later founded Wilbur B. Driver Co., Newark, N. J., of which he was chairman of the board of directors.

* * *

Liston T. Lange, 53, vice president and part owner, Ferguson & Lange Foundries Inc., Chicago, died of a heart attack Aug. 29.

* * *

Theodore W. Crossen, 53, formerly assistant to the vice president at the Eddystone, Pa., plant of General Steel Casting Corp., died Aug. 28. Mr. Crossen, an engineering graduate of Washington University, and a World War I veteran, retired from the company about 10 years ago due to illness.

* * *

Theodore E. Moritz, 77, purchasing agent, American Steel Foundries, Chicago, until his retirement in 1943, died Aug. 9, in Evanston, Ill. Mr. Moritz had been associated with the company for over 40 years.

* * *

Clinton P. Ziegler, 57, for 27 years superintendent of the Grand Rapids Foundry, Grand Rapids, Mich., died Aug. 6 in Cascade, Mich.

* * *

Garnet D. McConnell, 61, superintendent, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., died suddenly Aug. 15.

* * *

Ezra W. Clark, 69, until his retirement vice president of Clark Equipment Co., Battle Creek, Mich., died Aug. 10.

Plans Gray Iron Safety Booklet

Safety committee of the Gray Iron Founders' Society, Cleveland, plans preparation of a booklet setting forth a standard code of safe working practices for gray iron foundries.

The pocket-size booklet, which will ultimately be distributed to foundry employees throughout the industry, will identify all hazards known to exist in all departments and recommend courses of conduct designed to prevent accidents arising out of such causes. Text of the booklet will be based upon information secured from surveys of conditions in a number of typical gray iron foundries.

The committee, under the chairmanship of G. A. Riley, American Brake Shoe Co., New York, at a recent meeting discussed plans for a long-range safety program, promotion of an industry-wide safety contest, and development of a second safety manual for use by supervisors and top management.

Issues Catalog

Chambers, Bering, Quinlan Co., Decatur, Ill., has published a catalog giving a short history of the company, stating the company's plan of endeavor, and presenting pictures of the founders, present management and department personnel. Additional illustrations and text deal with company products and operations in the production departments and laboratories.

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Proposed Tentative Specifications for

ZINC-BASE ALLOYS IN INGOT FORM FOR DIE CASTINGS

ASTM Designation: B— -49T

Scope

1. These specifications cover commercial zinc-base alloys in ingot form for remelting for the manufacture of die castings. Three alloys are specified and designated as shown in Table I.

Process

2. The alloys may be made by any approved process.

Quality

3. The material covered by these specifications shall be of uniform quality, and shall be free from dross or other harmful inclusions.

Chemical Composition

4. The alloys shall conform to the requirements as to chemical composition prescribed in Table I.

TABLE I.—Chemical Requirements

Composition	Alloy XXI	Alloy XXIII	Alloy XXV
Copper, per cent	2.5 to 2.9	0.10 max.	0.75 to 1.25
Aluminum, per cent	3.9 to 4.3	3.9 to 4.3	3.9 to 4.3
Magnesium, per cent	0.02 to 0.05	0.03 to 0.06	0.03 to 0.06
Iron, max., per cent	0.075	0.075	0.075
Lead, max., per cent	0.005	0.005	0.005
Cadmium, max., per cent	0.004	0.004	0.004
Tin, max., per cent	0.002	0.002	0.002
Zinc, per cent	remainder	remainder	remainder

Sample for Chemical Analysis

5. If the ingots are shipped in carload lots of the same alloy, not less than five ingots shall be taken at random from the carload for sampling. If the shipment is less than a carload lot, one sample ingot shall be taken for each 10,000 lb or fraction thereof. When it is deemed necessary, a sample may be taken from each melt of 1000 lb or more.

Sampling for Chemical Analysis

6.(a) The samples for chemical analysis shall be taken by sawing, milling, or drilling in such a manner as to be representative of the average cross section of the ingot.

(b) The saw, drill, or cutter used for taking the sample shall be thoroughly cleaned. No lubricant shall be used in the operation and the sawings or metal chips shall be carefully treated with a magnet to remove any particles of iron introduced in taking the sample by the method prescribed in Paragraph (a).

(c) An optional method of sampling for analysis may be by melting together representative portions of each ingot selected, and then sampling the liquid composite by casting suitable specimens for either spectrographic or chemical analysis.

Method of Chemical Analysis

7. The chemical analysis shall be made in accordance with the Standard Methods of Chemical Analysis of Zinc-Base Die-Casting Alloys (A.S.T.M. Designation: E 47).[1] The Tentative Method of Spectrochemical Analysis of Zinc-Alloy Die Castings for Minor Constituents and Impurities (A.S.T.M. Designation: E 27)[1] may be used when analyzing for minor constituents and impurities, providing that in case of dispute the results secured by Methods E 47 shall be the basis for acceptance.

Inspection

8. (a) Inspection may be made at the manufacturer's works where the alloys are made, or at the point where they are received, at the option of the purchaser.

(b) If the purchaser elects to have inspection made at the manufacturer's works, the manufacturer shall afford the inspector representing the purchaser all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

Rejection

9. Material that does not conform to the requirements of these specifications may be rejected, and if rejected shall be replaced by the manufacturer without charge to the purchaser. The full weight of the rejected material shall be returned to the manufacturer.

Rehearing

10. In the case of dissatisfaction regarding rejections based on quality or chemical composition requirements as specified in Sections 3 and 4, respectively, the manufacturer may make claim for a rehearing as a basis of arbitration within 15 calendar days after receipt by the manufacturer of the rejection notification.

[1] 1946 Book of A.S.T.M. Methods of Chemical Analysis of Metals.

Tentative Specifications for

MAGNESIUM-BASE ALLOYS IN INGOT FORM FOR SAND, DIE AND PERMANENT MOLD CASTINGS

ASTM Designation: B93-49T

Scope

1. These specifications cover commercial magnesium-base alloys in ingot form for sand castings, die castings, and permanent mold castings. These alloys have a specific gravity of 1.9 or less. Seven types of alloys are specified and are designated alloys A8, A10, AS100, AZ63, AZ91, AZ92, and M1 (Note 1).

Note 1.—Explanatory notes pertaining to the alloys covered by these specifications when used in the form of sand castings, die castings, and permanent mold castings are given in connection with Tentative Specifications for Magnesium-Base alloy Sand Castings (ASTM Designation B80), the Tentative Specifications for Magnesium-Base Alloy Die Castings (ASTM Designation B94), and the Tentative Specifications for Magnesium-Base Alloy Permanent Mold Castings (ASTM Designation B199).

Manufacture

2. (a) The material may be made by any approved process.

(b) The ingots shall be uniform in quality and shall be commercially free from slag or other foreign material.

Chemical Composition

3. The alloys shall conform to the requirements as to chemical composition prescribed in Table I.

TABLE I—CHEMICAL REQUIREMENTS

Alloy	Magnesium Per Cent	Aluminum Per Cent	Manganese Min. Per Cent	Zinc Per Cent	Silicon Max. Per Cent	Nickel Max. Per Cent	Iron Max. Per Cent	Other Impurities Max. Per Cent
A8	remainder	8.0 to 9.0	0.18	0.20 max.	0.2	0.08	0.01	0.3
A10	remainder	9.4 to 10.6	0.13	.....	0.2	0.08	0.01	0.3
AS100 ...	remainder	9.4 to 10.6	0.13	.....	1.0	0.08	0.01	0.3
AZ63	remainder	5.5 to 6.5	0.18	2.7 to 3.3	0.2	0.20	0.01	0.3
AZ91	remainder	8.5 to 9.5	0.15	0.5 to 0.9	0.2	0.08	0.01	0.3
AZ92	remainder	8.5 to 9.5	0.13	1.7 to 2.3	0.2	0.20	0.01	0.3
M1	remainder	.....	1.30	.....	0.1	0.08	0.01	0.2

Sampling for Chemical Analysis

4. (a) The sample for chemical analysis shall be taken by sawing, drilling or milling the sample ingot in such a manner as to be representative of its average cross-section. The sample shall weigh not less than 50 grams.

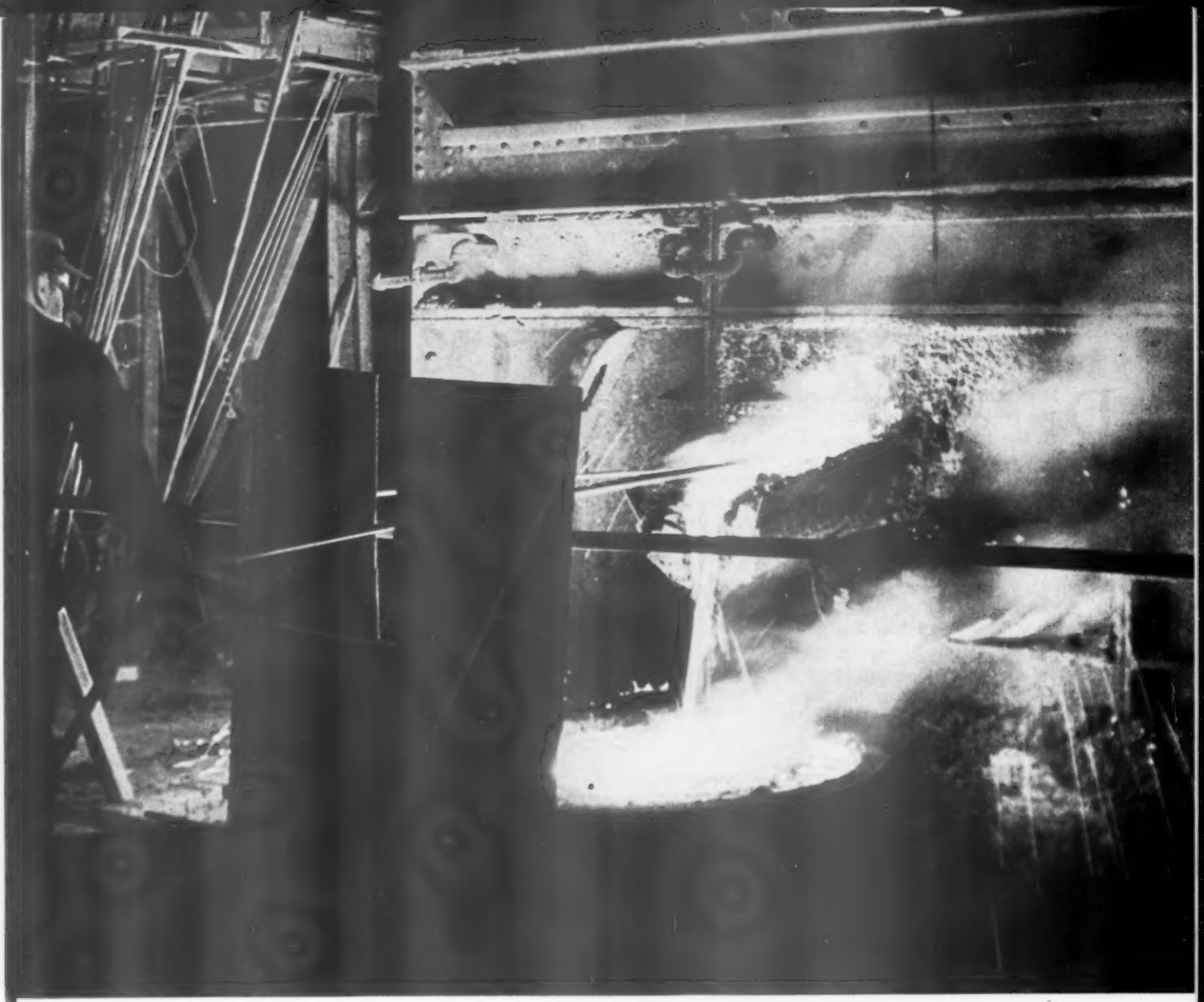
(b) The saw, drill, or cutter used for taking the sample shall be thoroughly cleaned. No lubricant shall be used in the operation, and the sawings or metal chips shall be carefully treated with a magnet to remove any particles of iron introduced in taking the sample.

Methods of Chemical Analysis

5. The chemical analysis shall be made in accordance with the Standard Methods of Chemical Analysis of Magnesium-Base Alloys (ASTM Designation E35), or the tentative Photometric Methods for Chemical Analysis of Magnesium and Magnesium-Base Alloys (ASTM Designation E61), or by any other approved methods agreed upon by the manufacturer and the purchaser. The analysis may be made spectrographically provided that, in case of dispute, the results secured by Methods E35 shall be the basis for acceptance.

Rejection

6. Material that fails to conform to the requirements of these specifications may be rejected, and if rejected, the manufacturer's responsibility shall be limited to replacing the rejected material without charge to the purchaser. The full weight of rejected material shall be returned to the manufacturer.



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	Typical Composition
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

Large stocks are carried of all grades of alloys, and they can be supplied in any of the standard lump, crushed, or mesh sizes.

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By EDWIN BREMER

FOUNDRY Developments

DIFFUSION of iron oxide into the periclase crystals adjacent to the hot face of basic brick in open-hearth service, and subsequent growth of those crystals probably has greater influence upon peeling of the hot face than growth of the original chrome crystals according to a paper presented by T. F. Berry, W. C. Allen and R. B. Snow, U. S. Steel Corp. of Delaware, Kearny, N. J., at the meeting of the American Ceramic Society. Petrographic evidence does not show a growth of the original chrome crystals in the highly altered silicate zone of the used roof brick, and evidence was presented to show that the silicate layer actually may protect the remainder of the brick from a more rapid infiltration of iron oxide.

* * *

STUDYING the effect of various melting conditions on valve bronze containing 88 per cent Cu, 6 per cent Sn, 4.5 per cent Zn, and 1.5 per cent Pb, Baer and Loring in a paper at the AFS convention found that melting directly exposed to the air in an induction furnace gave normal density and tensile properties. Under dry charcoal cover density and tensile properties were lowered, while under wet charcoal greater reduction in properties as well as unsoundness were found. Treatment of the melt with dry nitrogen improved density and tensile properties of metal melted under wet charcoal. Bronze melted without cover and held as long as 15 minutes at high temperature showed no appreciable change in mechanical properties.

* * *

INVESTIGATION carried on in a British foundry on use of rosin-coated molding sand indicates that it gives excellent results in production of gray iron castings with section from ¼ to 1½ in. thick. The castings are reported clean, true to pattern and with an excellent skin. Material used was a Swedish wood rosin dissolved in methylated spirits (wood alcohol), and the amount of rosin, 2 per cent, was added to dry sand in an ordinary mixer. Coated sand then was dried in a rotary drier operating at 200° C (392° F) to evaporate the solvent and set the rosin around the sand grains. Lumpy sand from that operation was crushed in an ordinary sand mill. To bond the sand for molding, it was made tacky by addition of 0.75 per cent of the rosin solution during milling. When thoroughly mixed 3.5 per cent bentonite was added with sufficient water to develop the desired bonding quality. Resulting sand is said to flow and ram easily, strip well, and to be clean in working.

* * *

COMPREHENSIVE investigations by the Metallurgy Division, National Bureau of Standards, Washington, in the field of x-ray strain measurements have been directed toward improving the sensitivity and precision with the view of applying the procedure to detecting fatigue damage in metals before actual fracture occurs. Diffraction patterns with the x-ray beam normal to the surface and at 45° incidence suggest that the measurement of lattice strain might provide a powerful tool for the investigation of the mechanism of plastic deformation.

* * *

MAGNESIUM castings weighing 2 and 3 pounds were produced in Germany during the war on a novel, fully-automatic die casting machine which is described in a report "PB 97113, Mahle Die Casting Machine and Dies" available from the Office of Technical Services, Department of Commerce, Washington 25, for $1.50. Machine is the hot-chamber injection type, and while not the most improved model, certain desirable features are recommended for further consideration in U. S. practice.

* * *

IN GREAT BRITAIN and on the Continent finned airplane cylinder heads are being produced in permanent molds in combination with evacuation of the air at the fin tips during pouring. Blades used to form the fins are machined from chrome-tungsten-molybdenum sheets, and arranged so that they may be withdrawn from the casting so that the latter may be lifted from the mold. Air channels 0.06-in. wide and 0.007-in. deep are milled on the top of the blades for application of vacuum. Blades also are arranged so that they are not all withdrawn at the same time.

* * *

CO-OPERATION of Kaiser-Frazer and Doehler-Jarvis engineers has resulted in the production of die-cast door frames for automobiles. Frames are made of aluminum alloy, and produced in a die weighing approximately 13 tons. Casting weighs about 12 lb after trimming and completed door weighs 9 lb less than its steel counterpart. It is said that the doors with the die cast frames can be assembled without refitting, and lack the "tinny" sound characteristics of many conventional doors when slammed.

* * *

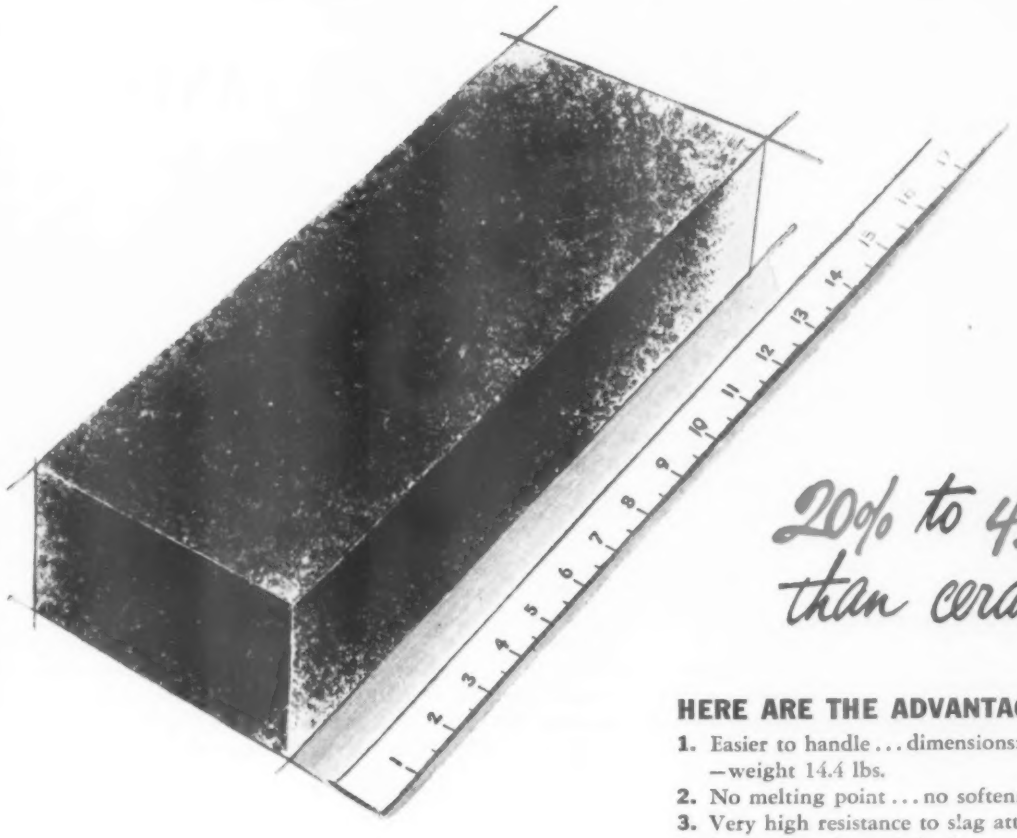
PENNSYLVANIA steel foundry points out that the 19.50 per cent Cr, 9 per cent nickel austenitic steel is suitable for applications at two extremes of temperature range. It is being used in castings for pressure equipment in storage facilities for liquid oxygen at temperatures approximately 298 degrees below zero. Same alloy steel is being employed successfully in engineering applications at high operating temperatures for jet-engine components, turbosupercharger parts and in gas turbines.

* * *

ARTICLE in a recent issue of *Science and Engineering* published by the India Society of Engineers, Calcutta, indicates that natural or synthetic rubber latex impregnated with sodium benzoate gives excellent resistance against corrosion; much better than latex alone. Small objects may be dipped in the benzoate latex, and the excess alloyed to drain. In the case of large objects, the material is sprayed on.

have you tried "national" Carbon?

a new 13½" Carbon Brick—



20% to 45% lighter than ceramics!*

HERE ARE THE ADVANTAGES:

1. Easier to handle . . . dimensions: 13½" x 6" x 3" —weight 14.4 lbs.
2. No melting point . . . no softening point
3. Very high resistance to slag attack
4. Immune to thermal shock
5. Fewer joints to cement—a faster, sounder job
6. Saves money all along the line

OTHER NEW BRICK SIZES:

Key brick 13½" x (6"-5") x 3"—weight 13.2 lbs.
Straight brick 9" x 6" x 3"—weight 9.5 lbs.
Key brick 9" x (6"—5⅜") x 3"—weight 9.1 lbs.

For more information, write to National Carbon Co., Inc., Dept. FO

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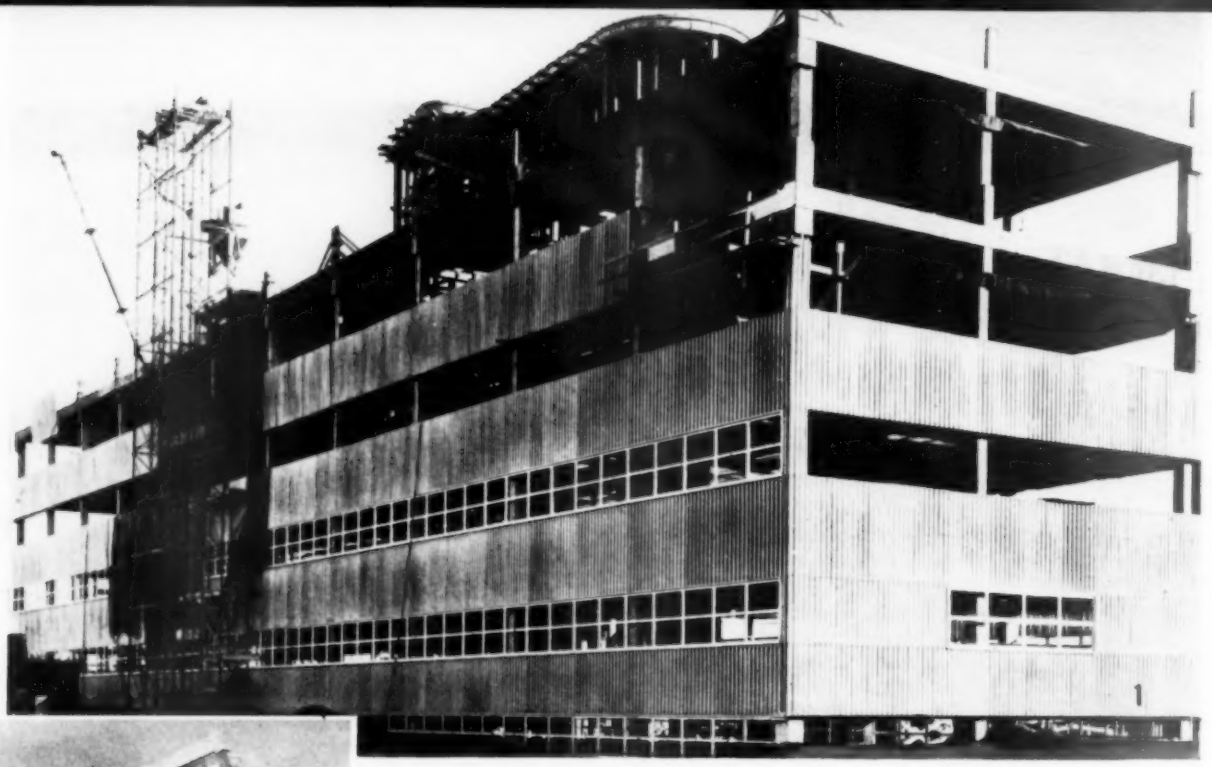
These products sold in Canada by Canadian National Carbon Company, Ltd., Toronto 4.

***Weights in lbs. per cubic foot of carbon vs. ceramic brick: Carbon—96. Firebrick—120-130. Acid-proof brick—148. Chrome brick—175-180.**



CAST ALUMINUM PANELS

Comprise Building's Exterior

THE office building for Aluminum Co. of America's Davenport, Iowa, Works makes use of more than 960 sectional, cast aluminum panels for the exterior sheathing. The new, 4½-story structure will serve as an administration building at Alcoa's recently completed rolling mill there.

These sand cast aluminum panels, the result of intensive developmental work by Alcoa, its architects and builders, constitute a strong, weather-resistant curtain wall. Panels are fastened to the building's structural steel frame, then backed with 4-inch cast slabs of diatomaceous earth. Fluted aluminum curtain walls, with their fire-resistant insulating slabs, have materially increased the usable floor space within the structure.

This new use of the cast aluminum wall panels has resulted in several construction innovations. Materials were conveyed to the upper stories and installed from within, thus eliminating the use of outside scaffolding, rigging and derricks. Cast anchors on each aluminum panel reduced erection time and permitted fewer men to secure the panels directly to the spandrel beams. Sectional aluminum panels were delivered to the building site ready for installation, thereby reducing congestion and allowing several crews to work simultaneously in close spaces.

Fig. 1 — Scene during construction of Alcoa's administration building at its Davenport, Iowa, works. Aluminum exterior is interrupted only by window glass

Fig. 2—Showing inner face of cast aluminum wall panel as workmen lower section into position

Fig. 3 — Casting an aluminum spandrel at company's sand foundry in Cleveland

Survey indicates Estimated Annual Return on Investment: 133%!

Here are the facts and figures from a Thermex Comparative Core Cost Study of the oven-equipped core room in a New York manufacturer's foundry . . . typifying the remarkable savings to be had with Thermex High Frequency Core Baking Equipment.

Present Operating Cost (including labor, material, and fuel): $259.76 per day. Estimated Operating Cost using Thermex Model 1,000C Core Baking Equipment: $184.76. Annual Operating Savings (250 days): $18,750. Floor Space Savings (800 square feet at $1.25 per square foot): $1,000 annually. Total Annual Savings: $19,750. *Estimated Annual Return on Investment: 133%!*

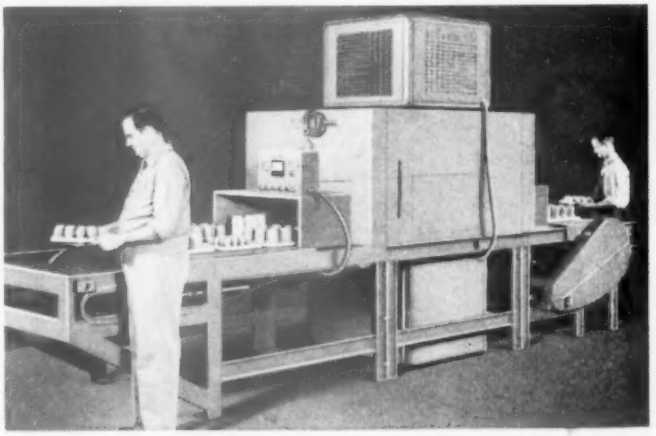
Other examples of the remarkable savings that can be effected with Thermex high frequency Core Baking Equipment are indicated by the excerpts below, taken from actual surveys* made by Thermex high frequency specialists.

LABOR SAVINGS

Based on installation of Thermex 500C unit, reducing man-hours from 130 to 88 per day. Present Labor Cost per day: $151.36. Estimated cost using Thermex equipment: $105.84. Annual Labor Savings (200 days): $9,104.

CORE MIX SAVINGS

Based on comparison between presently employed Oil Sand Mix and proposed Resin Sand Mix. Oil Sand Mix (22 batches @ $6.45): $141.90 per day. Resin Sand Mix (22 batches @ $6.03): $132.66 per day. Annual Core Mix Savings (250 days): $2,310.



FUEL SAVINGS

Based on 16 tons of cores per day. 16 tons at Fuel Oil cost of $3.00 per ton: $48.00. 16 tons at power cost of $0.892 per ton (including tube replacement cost): $14.27. Annual Fuel Savings at $33.73 per day: $8,432.50.

FLOOR SPACE SAVINGS

Based on installation of one Thermex Model 1,000C and one Thermex Model 500C. Total space now used for core making, excluding oven space: 5,400 square feet. Thermex equipment: 3,600 square feet. Annual Floor Space Savings at $1.50 per square foot: $2,700.

Thermex

(T. M. Reg. U. S. Pat. Off.)

THE GIRDLER CORPORATION • THERMEX DIVISION
LOUISVILLE 1, KENTUCKY

*Surveys containing above information on file with THERMEX.

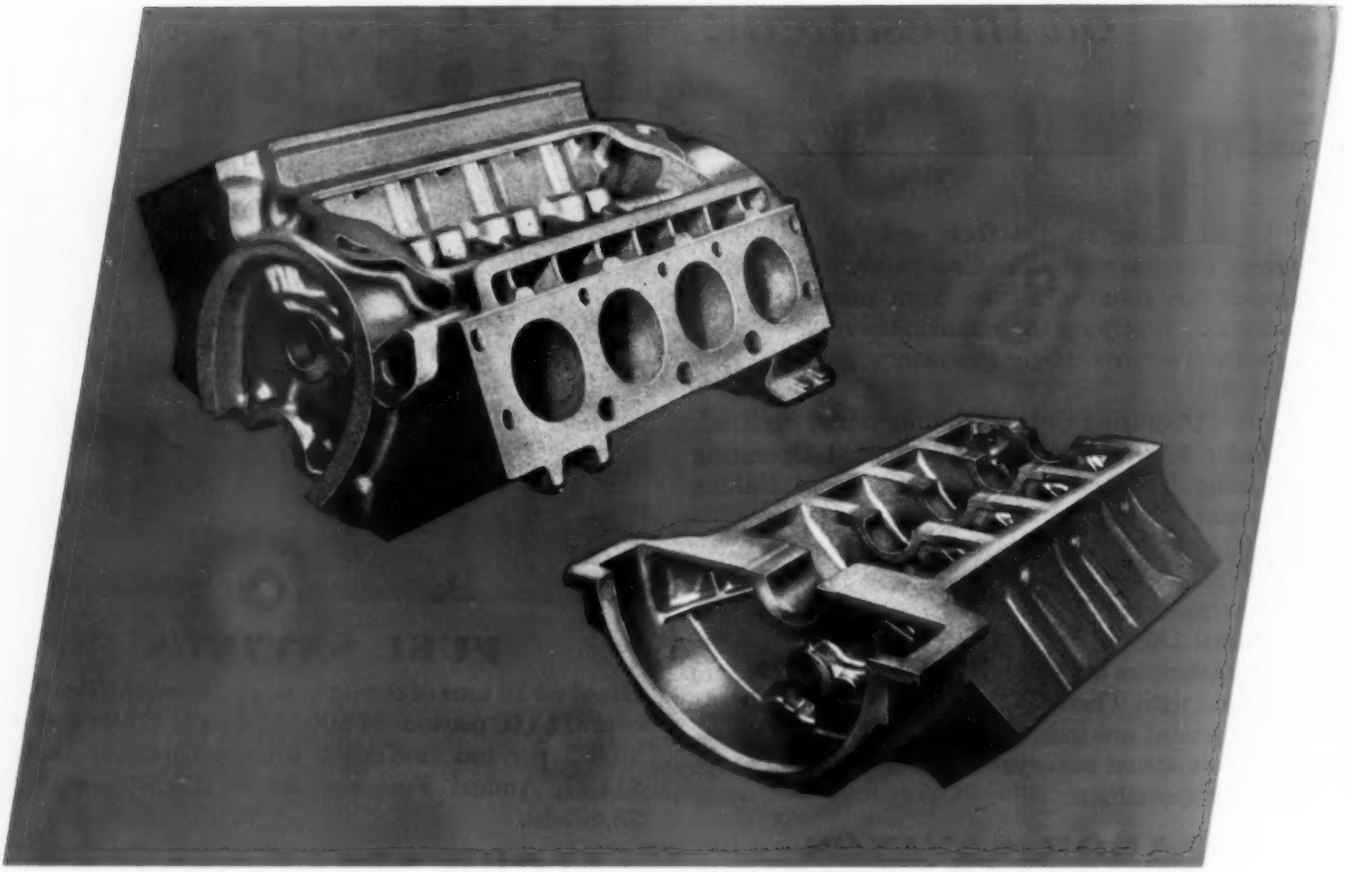
Thermex will analyze your core costs without charge

Thermex Comparative Core Cost Studies are made by authorized Thermex high frequency specialists following a preliminary investigation to determine the feasibility of high frequency core baking for your particular operation. There is no charge for this service, of course.

The study covers all phases of your operation and results are submitted in proposal form, including a detailed breakdown of all operating expenses, equipment costs, and suggested layout for your modernized core room. In it you will find all the facts you need to make a sound, economical decision.

Get in touch with Thermex soon. A Thermex Comparative Core Cost Study can very likely show you the way to profit-boosting core room economies!

Another Engineering Achievement by BUFFALO PATTERN WORKS



These New Motor Blocks Are Made With High Accuracy Buffalo Pattern Works Equipment

Buffalo Pattern Works recently completed several duplicate sets of machined, high-speed production equipment to produce this late model cylinder block with a low scrap ratio and low machining cost. This brand of skill has been the hallmark of Buffalo Pattern Works for over 56 years.

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Since 1893

BUFFALO PATTERN WORKS

830 HERTEL AVE. BUFFALO, N. Y. RI. 3512

Medical Program

For an Average Foundry

(*Continued from page* 79)

of a hospital.

Other things also influence the arrangement of a plant dispensary or hospital. If a medical program calls for examinations at the plant, or treatments of more than the usual first aid nature, then more space and equipment are necessary.

However, a first aid room equipped to completely care for minor injuries, give proper pre-ambulance care to more severe injuries, administer to the daily aches and pains of non-industrial nature, give anti-tetanus shots, and give repeat treatments to injuries under a doctor's instructions, is a necessity in any good medical program and is a great money-saver.

The basis on which any industrial medical program must rest is the physical examination. A program must begin with a pre-employment physical examination and must include annual physicals, both with x-ray. The pre-employment examination should determine first whether the applicant has the physical ability to perform the work required. The examination must be sufficiently complete to expose any reasonably apparent weakness or impairment which might interfere with efficiency. Here is where the examining doctor's interest in and knowledge of foundry operations is of great assistance.

First Examination Important

Also, to be emphasized in the first examination are those conditions which may, in the future, be alleged to be industrial in origin, or which may be aggravated by foundry conditions so that they become industrial liabilities. These are primarily conditions of heart or lungs, potential or existing hernias, varicose veins, and, in some cases, sight or hearing.

The physical condition of a person at time of employment is so important to him and to the prospective employer that I never cease to wonder at those who do not require a complete pre-employment physical examination with chest x-ray, blood tests, etc.

It is with this first examination that we accomplish the first two results desired of a medical program, i.e., elimination, before hiring, of those not physically fit, and reduction of the possibilities for industrial liability. At this time, we also lay the groundwork for achievement of the third objective, maintenance of the best possible physical condition of all workers during their employment.

However, the detection and correction of slowly progressive diseases or conditions will depend largely on the periodic examinations and the follow-up.

There are many changes in physical condition from year to year which, in themselves, seem too minor for consideration to most of us, even if we are aware of them. And yet these very trivial matters—change in weight, blood pressure, varicose veins, defective teeth, etc.—may, if uncared for, lead to a condition which will cause much lost time, shorten a worker's productive span or even result in untimely death.

So therefore, the annual repeat physical examination should emphasize not only those things actually or potentially industrial, but also the more common weaknesses which may develop with advancing years.

Once a possible detrimental condition is disclosed by examination, a follow-up system is necessary. People are all too optimistic concerning their own safety and well being. The mere act of advising a person that he should consult a doctor about a certain condition will, in a majority of instances, fail to get him to do so. This is especially true if he has noticed no ill effects from the supposed condition.

Some plants may be in the position that they can tell an employee: "You see your doctor about this *now* —or else." And in some cases this is an absolute necessity, regardless of the result to labor-management relations. However, this is a good policy only in certain cases. Furthermore, in many foundries it would be an impossible policy.

Thus, the only alternative, is a good follow-up system, concentrating on convincing the worker that it is to his best advantage to act on the advice of the examining physician. I do not believe that a part-time company doctor should be expected to handle this part of the medical program. The extent of his participation should be to advise the person of his findings, preferably in writing (a form letter is satisfactory), with notice to the proper person on the company staff who will handle the follow-up. This would be the safety director or whoever in the plant is in charge of the program.

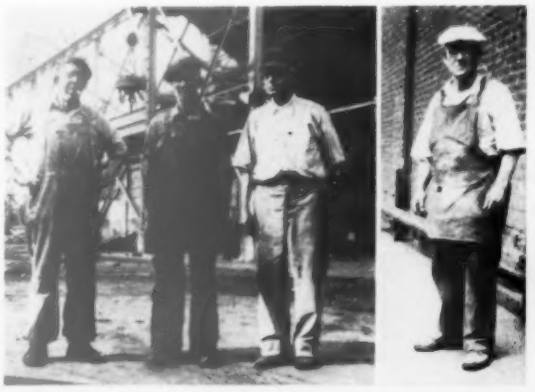
My remarks concerning the part of non-industrial health conditions in the medical program should not be construed to suppose that I am advocating industrial subsidy for non-industrial illness. The physical examinations are required for good industrial reasons and the only thing that I suggest is that the employee be advised of any detrimental conditions disclosed by these examinations, and urged to do something about it at his own expense. The cost of so doing is practically nothing.

Before leaving the subject of examinations, it should be mentioned that the company doctor may not have the inclination or the experience to render a final report on all phases of the examination, particularly the diagnosis of x-ray films. It may be necessary to have a specialist report on the x-rays, or you may desire to check the diagnoses of the company physician with reports from a chest specialist.

If this is the case, do not hesitate to include such outside service in your program. The x-ray feature may well be the highest single item of cost in your medical program and it can be the source of the greatest benefit of any part of your program, at least financially. Be sure your x-ray service is good. It might be well to add here that the doctor, as well as all others concerned, should have the clear understanding that all x-ray films are the property of the company.

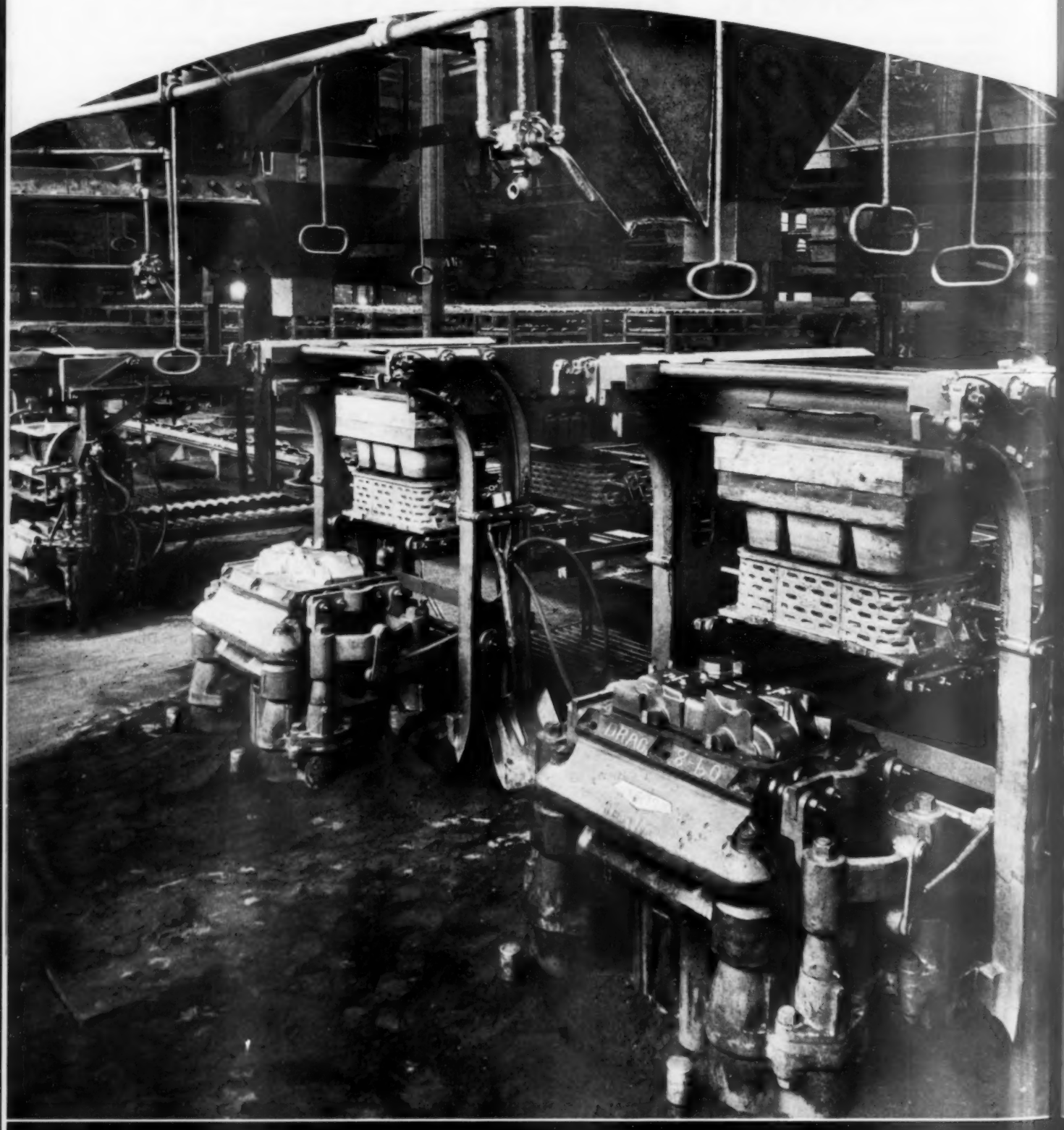
Now, there are a couple of things which should be a matter of policy in the medical program. The first is that, under no circumstances,

(*Continued on page* 140)



FOUR VETERAN foundrymen of the Marion Malleable Iron Works, Marion, Ind., have accumulated a total of 167 years of service with that company. Shown here, left to right, they are: Franklin S. Oliver, 56 years old, who has been with Marion since 1916; Aaron Waldo Norris, 61 an employee since 1906; Albert J. Thomas, 76, who joined the company in 1907, and George W. Stuart, 65, who has the longest service record of the quartet—49 years

Automotive



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Castings!

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OSBORN®

MOULDING MACHINES

MEMBER MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

(*Continued from page* 137)

should the physical examination be used to transfer or separate an employee, when the actual reason for such change is entirely separate from his physical condition. Don't use the medical program as an "out" to achieve what you can't otherwise accomplish with the "cards on the table." If you try it, you fool no one but yourself, and sooner or later the practice will tear your medical program wide open.

The use of examinations for purpose of discrimination is one big reason, if not *the* reason, why many unions today fight them so hard.

The other item which should be definite policy is this: Advise the employee of the findings of the examinations. If he has anything wrong with him, be sure he understands clearly about it. If he uses his imagination in the absence of explanation, you can be sure that the seriousness of the ailment will be magnified out of all proportions to the actualities of the case.

This need for clear explanation is especially apparent in x-ray films. I know of foundries which gave employees no information whatever concerning x-ray diagnoses. The result was, in many cases, that the boys were constantly worrying over their condition. Some of them would have x-rays taken at their own expense, all too often by people who were

(*Concluded on page* 142)

Meetings of Interest to Foundrymen

Sept. 29-Oct. 1 — Magnesium Association, mid-year meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 3-4—Steel Founders' Society of America, fall meeting Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 7-8—New England Regional Foundry Conference, sponsored by New England Foundrymen's Association and Massachusetts Institute of Technology, MIT, Cambridge, Mass.

Oct. 10-14—American Society for Testing Materials, Pacific Coast meeting, Fairmont Hotel, San Francisco.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 14—Non-Ferrous Founders' Society, annual meeting Netherlands Plaza Hotel, Cincinnati.

Oct. 17-21—American Society for Metals, metal congress and exposition, Public Auditorium, Cleveland.

Oct. 21—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Oct. 21-22—Regional Foundry Conference sponsored by the Metropolitan, Philadelphia and Chesapeake AFS chapters, Stevens Institute, Hoboken, N. J.

Oct. 24-28—National Safety Council, 37th National Safety Congress and Exposition, Chicago

Oct. 26-28—National Metal Trades Association, annual convention, Palmer House, Chicago

Oct. 27-28—Gray Iron Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago

Oct. 28-29—Michigan Regional Foundry Conference sponsored by the Michigan AFS chapters, Michigan State College, East Lansing, Mich.

Nov. 2-4—Industrial Management Society, annual time and motion study clinic Sheraton Hotel, Chicago

Nov. 3-5—Meehanite Metal Institute, annual meeting. Hotel Carter, Cleveland

Nov. 4—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

Nov. 7-8—Annual Pittsburgh Conference on X-ray and Electron Diffraction, Mellon Institute of Industrial Research, Pittsburgh

Nov. 10-11 — National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York

Nov. 25-26—New York Regional Conference, sponsored by New York AFS chapters, Syracuse University, Syracuse, N. Y.

Nov. 28-Dec. 3—Chemical Industries, exposition, Grand Central Palace, New York

Nov. 30-Dec. 1-2—Society for Experimental Stress Analysis, annual meeting, Hotel New Yorker, New York.

Dec. 9—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

1950

(Tentative Schedule)

Jan. 16-19—Plant Maintenance Show and Conference, Public Auditorium, Cleveland

Jan. 20 — Malleable Founders' Society, semiannual meeting, Hotel Cleveland, Cleveland

February 9-10—Birmingham Regional Foundry Conference, sponsored by Birmingham AFS chapter.

Feb. 24—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Feb. 27-Mar. 3—American Society for Testing Materials, annual committee week, William Penn Hotel, Pittsburgh

Mar. 3—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

Mar. 10-11 — Ohio Regional Conference, Cincinnati, sponsored by Ohio AFS Chapters and University of Cincinnati.

Mar. 21-22—Steel Founders' Society of America, annual meeting, Edgewater Beach Hotel, Chicago

Mar. 24—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Apr. 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

May 8-12—American Foundrymen's Society, annual convention and exhibition, Cleveland

May 19—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 26—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 1-3—Electric Metal Makers Guild, annual meeting, Shawnee Hotel, Springfield, O.

June 22-23—Malleable Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

June 26-30—American Society for Testing Materials, annual meeting and exhibition, Haddon Hall, Atlantic City, N. J.

July 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Oct. 12-13—Foundry Equipment Manufacturers' Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 19-20—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati

Nov. 3-4—Metals Casting Conference, Purdue University, West Lafayette, Ind.

Nov. 8-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

WHEELABRATOR® USER FINDS

TRU·STEEL Shot

"Lasts 5 to 6 times as long as ordinary shot"

Established 1912

GRAY FORGINGS & STAMPINGS LIMITED

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CABLE ADDRESS: "GRAYWRENCH," TORONTO
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July 18, 1949

Gentlemen:

We are using a 27" x 36" Wheelabrator for cleaning alloy steel forgings after annealing and after heat treatment for plating. TRU-STEEL shot cleans work in the same length of time or less than ordinary shot, and the surface produced is very satisfactory for plating or painting.

We find TRU-STEEL shot lasts from 5 to 6 times as long as ordinary shot.

Blades used to last at the most 50 Wheel hours with ordinary shot—with TRU-STEEL approximately 400 hours.

Our wheel has been operating over 800 hours at this point perfectly satisfactorily.

In general TRU-STEEL shot costs half as much as ordinary shot, cuts down on maintenance and costly parts with less shot handling and storage.

All parts in the machine have a peened appearance rather than an erroded wear appearance, due to TRU-STEEL shot not breaking down into any angular particles. The dust collector is emptied 1/3 as often.

Yours very truly,

GRAY FORGINGS & STAMPINGS LIMITED

Peter B McCurdy

Metallurgist.

In test after test TRU-STEEL shot has proved its superiority over the best of the "old-standby" abrasives, because it lasts much longer, reduces machine maintenance costs, increases the life of machine parts, and saves storage space and shipping costs. Savings like these are reflected in surprising reductions in cleaning costs per ton.

Responsible for TRU-STEEL's eye-opening performance are these exclusive features: (1) round and solid; (2) hard and tough; (3) a genuine true steel that has received a full heat treatment, not just a draw or anneal; (4) wears down, does not break down; (5) accurately graded and controlled as to quality and hardness.

TRU-STEEL is the answer to the long-felt need for a superior abrasive that would afford top performance and economy. On the basis of its performance in actual production we are confident that it is the abrasive you will use tomorrow . . . *why not investigate it today?*

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(*Concluded from page* 140)

not specialists, and they would end up with erroneous and sometimes frightening diagnoses.

So far in this discussion, I have slighted the mention of cost. Just what is the cost of a medical program? It is impossible to state, with even approximate accuracy, the gross initial and annual outlay necessary for a program such as we are talking about. Using very rough figures, I will make the following statements:

One could probably figure $2000 for a first aid room, if necessary to build. Another $1000 to $1500 for equipping the building. Possibly from $2500 a year up for each nurse required. Examinations will cost from $600 up annually, depending upon fee and number examined, and x-ray may cost another $1500 to $2500. Add the other operating and overhead expenses and you may arrive at an annual cost of from $7500 up. However, this figure could vary much either way.

Program Saves Money

But that is gross expenditure. I would like to point out a few things which will more than balance the ledger and make the medical program an *asset*.

Here's one: Every person rejected in your pre-employment physical who thereafter progresses to silicotic disability represents a saving to you of from $7500 to $12,000. That is a year's cost for your program.

And another: Every hernia case which is prevented from entering your plant unknown is a potential saving of from $500 up.

Whenever a bad heart condition is discovered in examination, it reduces the possibility of a health claim attributable to industrial cause. Another $7500.

Discovery of tuberculosis in early stages may save or reduce the cost of a silico-tuberculosis case.

Repeat-treatment of injuries in the first aid room instead of a doctor's office will save many, many $2 to $5 fee bills.

Many other similar savings could be mentioned but I do not believe it necessary to prove that a good medical program provides an income, sometimes apparent, sometimes intangible, but nevertheless actual in its effect on the cost of doing business.

Now, for the success of a medical program, the basic policy must be this:

A sincere intent to place people in the job for which they are best fitted and maintain their well being while employed. There must be complete honesty and frankness in administration of the program.

This entire subject may be summarized as follows:

In the first place, you must know *why* you have a medical program—what you want to accomplish, and you must be honest and sincere in administering the program to achieve your objectives.

Care must be taken in choosing a doctor who is interested in industrial practice.

The nurse must be industrially experienced or trained by you to understand the close relationship between three programs—medical, safety and labor relations. She must be able to adequately care for the results of injuries and illnesses, secure and report information which will assist in preventing them, and perform all tasks in such a way as to maintain and improve the relationship between labor and management.

The first aid facilities must be adequate for the needs of the individual plant. If the doctor's office and a hospital are reasonably available, the plant dispensary equipment surely need not be extensive. In such case, the requirements could be listed roughly as follows: Hospital bed, desk, work table, treatment chair, sterilizer, x-ray viewboxes—double or triple, x-ray film filing cabinet, treatment lamp, weight scales, sink with adequate counter space, magnifying light stand for eye injuries, refrigerator, typewriter, the smaller instruments for blood pressure, eye injuries, splinter removal, etc., and adequate storage space for such medicines and dressings as will be kept on hand.

In building or allotting first aid space, allow for enlarged operations in the future.

The pre-employment and periodic examinations should be the usual physical check, including the common blood and urine tests, and x-ray of the chest.

The program must include proper follow-up of employees, after results of examinations are known, to get them to take personal action for any developing illnesses or impairments.

Book Review

Bottom-Up Management, by William B. Given Jr., president of American Brake Shoe Co., cloth, 171 pages, 5 x 8 in., published by Harper & Brothers, New York. Price $2.50.

Bottom-up management, as Mr. Given presents it, leaves to foremen, superintendents and intermediate executives the basic job of devising work methods to execute top management policy. He presents his case for allowing initiative up and down the line by explaining the workability of his system in his own company. By analyzing procedures and mechanisms, and by using human experience as illustration, he shows that his plan is flexible enough to apply to other kinds of businesses.

Michigan Conference Program Announced

A well diversified program of papers has been announced for the annual Michigan Foundry Conference to be held at Michigan State College, East Lansing, Mich., Oct. 28-29. As in recent years the conference is sponsored by the school's Department of Mechanical Engineering and the four Michigan chapters of the American Foundrymen's Society.

Program committee for the conference includes: Stanley Davis, Campbell, Wyant & Cannon Foundry Co., Muskegon, and Ross P. Schaffer, Lakey Foundry & Machine Co., Muskegon, of Western Michigan Chapter; Walter Bohm, Buick Motor Division, Flint, and Marshall Chamberlin, Dow Chemical Co., Bay City, of Saginaw Valley Chapter; Frank Brewster, Harry W. Dietert Co., Detroit, and Walter Kantzler, Kelsey-Hayes Wheel Corp., Detroit, of Detroit Chapter; and Austin Smith and C. C. Sigerfoos, both of Michigan State College, representing Central Michigan Chapter.

The detailed program follows:

Friday, Oct. 28

8:30-9:30 a.m.—Registration at Union Building.

9:30 a.m.—Chairman, C. H. Jacobson, production manager, Dake Engine Co., Grand Haven, Mich. Keynote Address, "New Developments in the Foundry Industry," L. A. Danse, supervisor, materials and processes, General Motors Corp., Detroit.

10:15 a.m.—"Mechanizing for Small Jobs," Frank Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill.

11 a.m.—Discussion of mechanizing problems. Walter Gerlinger, Gerlinger Inc., Milwaukee. Discussion of mechanizing problems with special reference to foundry costs, Walter Hummel, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich.

12 noon—Luncheon—Union Building.

1 p.m.—Nodular Iron Session; Chairman, Fitz Coghlin Jr., metallurgist, Albion Malleable Iron Co., Albion, Mich. Casting Stress Analysis Session; Chairman, V. A. Crosby, metallurgical engineer, Climax Molybdenum Co., Detroit.

3 p.m.—"Stress Analysis of Castings," William T. Bean Jr., Detroit.

4 p.m.—Discussion of Stress Analysis Problems, Frank Tatnall, manager of testing research, Baldwin Locomotive Works, Philadelphia.

6:30 p.m.—Dinner and entertainment—Union Building.

Saturday, Oct. 29

9 a.m.—Chairman, L. L. Clark, plant metallurgist, Buick Motor Division, Flint, Mich. "Progress Report on Foundry Research," H. L. Womochel, Mechanical Engineering Dept., M.S.C.

10 a.m.—"The Effect of Mold Materials on Shrinkage," Harold Austin and Walter Bohm, Buick Motor Division, Flint, Mich.

10:45 a.m.—Discussion of mold materials, C. A. Sanders, vice president, American Colloid Co., Chicago.

11:30 a.m.—"Practical and Social Aspects of Cupola Smoke Control," W. N. Witheridge, ventilation consultant, General Motors Corp., Detroit.

It stops profit leaks in the cleaning room

LIKE A CHAIN that is no stronger than its weakest link, a foundry can not attain peak efficiency—and earning power—with jumbled piles of castings strewed around the cleaning room.

In most foundries the time and the cost of handling castings from the shakeout through the cleaning room can be—and should be reduced.

Apron Conveyors of proper design, and properly used, permit cleaning room and inspection operations to be synchronized with the tonnage passing over shakeouts—eliminate re-handling—and produce an orderly "flow" of castings similar to the controlled flow of sand through a sand conditioning plant—or to the control of molding, pouring, cooling and shaking out made possible with a run-around mold conveyor.

Slow speed Apron Conveyors, with or without hoods, provide one of the few generally approved methods of cooling castings from shakeout temperatures of around 1500°F., to the temperatures required for mill cleaning or hand sorting.

Apron Conveyors with heavy duty flat tops and no sides, that permit the easy loading and unloading of castings, make ideal chipping conveyors.

Let the Bartlett-Snow engineers, with their wide familiarity with the needs of practical day to day foundry operation, work with you in making your cleaning room as efficient and smooth running as other parts of your foundry. The C. O. Bartlett & Snow Company, Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit, Chicago.

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CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

By ARTHUR H. ALLEN
Detroit Editor
THE FOUNDRY

AROUND Detroit

General Motors engineer sees compulsory control of dust, smoke and fumes arising from foundry operations. . . . New arrester for cupolas is patterned after blast furnace top

EFFECTIVE, if not complete, control of dust, dirt, smoke, etc. arising from foundry operations eventually will be a "must," is the firm belief of L. A. Danse, General Motors metallurgist and engineer, who is, among other things, head of the corporation's industrial waste control committee. His group is already sponsoring projects at various GM plants for control of wastes, running into several million dollars for the necessary equipment.

Danse has been digging into the problem of controlling foundry cupola gases and smoke, and he thinks much more can be accomplished and will have to be done if the trend of municipal smoke control ordinances keeps moving in its present direction. He returned recently from a visit to Los Angeles where he inspected a novel closed-top system of cupola dust control installed on a small unit operated by a Glendale foundry, and was much impressed by the results being realized there. The plant in question happened to be located only a short distance from a compounder of pie and cake mixes. The latter organization was voicing strong objections to the "pepper" from the nearby foundry which was appearing in its product, and threatened to call out the city authorities if the foundry operator did not do something about the smoke nuisance.

Strict smoke control regulations now are in force in Los Angeles. So the foundry owner called in consulting engineers to do something about his cupola smoke. It is only a small stack, perhaps 30-inch diameter and producing possibly 3½ tons of iron an hour. The experts went to work and developed a scheme patterned closely along the lines of a blast furnace top, with a charging bell, downcomers, dust collectors, gas scrubbers, washers, burners and the like. When they had finished and the installation was completed, the foundrymen discovered he had spent close to $20,000, but at least there was no longer any trace of dust or smoke or fumes to bother the pastry manufacturer.

Actually, it is believed the control system could have been built for around $10,000, the extra cost having been occasioned by revisions made as the work went along. Despite the high cost, the foundry operator thinks he may be able to make up the investment in a year or two, by virtue of the 15 per cent saving in coke realized, more uniform pouring temperatures, less scrap and other economies effected.

One of the engineers who participated in the design of the equipment is planning to visit Detroit, probably this month, to address the General Motors foundry committee and explain details of the installation, this at the invitation of Danse who thinks the West coast unit has considerable merit and might be worthy of a trial on one of GM's cupolas. Admittedly the cupola on which it was erected is only a laboratory-size job in the automotive sense; still it is doing an effective job of control. Whatever the cost, Danse is of the opinion that elimination of cupola fumes must come, either willingly or enforcedly, so the expense involved will have to be added to production costs.

* * *

ALL MONTHLY records for production of cars and trucks were cracked in August, when better than 675,000 units rolled from assembly lines in the U. S. and Canada. The total is not likely to be bettered for some time to come, since the shorter work month in September and the suspension of overtime operations resulted in some slowing of production. It is expected that for the remainder of the year a reduced rate of operations will be in force. As an example of the tremendous outpouring of vehicles in August, consider the fact that General Motors foundries alone tapped better than 85,000 tons of iron.

No major changes have been incorporated in the 1950 Nash models announced formally about ten days ago. However, a new cylinder head

(*Concluded on page* 146)

ENGINE BLOCKS pictured here are only 12 hours' supply at the Tonawanda, N. Y., Chevrolet plant. The Tonawanda factory and Flint, Mich., engine plant supply the engines for Chevrolet assembly lines

Foundry Conveying is a *Rough Game*

FOUNDRY CONVEYERS must be designed and built to operate under severe service. Gravity and power conveyers to be applied in this industry should have extra weight and strength built into them if they are to stay on the job. Because Mathews Engineers know foundry conveying problems, Mathews Conveyers are found in most of the great brass, steel and gray iron foundries in the United States and Canada, operating under extremely rough conditions, with a minimum of costly maintenance attention.

MATHEWS CONVEYER COMPANY
ELLWOOD CITY, PENNSYLVANIA

MATHEWS CONVEYER COMPANY WEST COAST
SAN CARLOS, CALIFORNIA

MATHEWS CONVEYER COMPANY, LTD.
PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

(*Concluded from page* 144)

has been designed for the Ambassador 6-cylinder engine. In the new head, valves are inclined from the vertical by 11 degrees to permit improved gas flow and changes in the combustion chamber. Principal reason for the latter was to raise compression ratio from 7.1 to 7.3:1. However, no increased power or torque will be claimed for the Ambassador engine. The engine also has a simplified method of lubricating the overhead valves.

The Nash Ambassador model now offers the Hydra-Matic drive as optional equipment, necessitating a number of mechanical changes. For example, since the flywheel forms part of the housing for the fluid coupling and comprises a stamped steel plate with ring gear teeth cut directly into the edge, the cast iron flywheel with the starter ring gear shrunk in place over it has been dispensed with. This has meant that balancing must be done by drilling from the crankshaft cheeks instead of from the cast flywheel as in the past.

Outwardly, both the Nash Ambassador and Statesman (as the former 600 model is now called) show little deviation from 1949 lines, with the single exception of the rear window which is 10 inches wider and provides 33 per cent more glass area.

Nash is understood to have a completely new small car in the works, with shorter wheelbase and narrower tread, although still providing what might be considered a "full-size" body in the accepted sense of the word. Its introduction probably will not be made until after the first of the year, although much may depend upon what Hudson does with its new small job. The latter, also with reduced wheelbase and tread, is closer to the assembly line than the Nash, and may be a possibilitiy for this month or next, if present planning eventuates.

* * *

DETROIT had its first look at Lake City Malleable Co.'s "salesmobile" on Sept. 12 when company president J. H. Redhead and executive vice president A. F. Jackson met the press at a downtown hotel and took them through the unique traveling castings display (THE FOUNDRY, July, p. 124) before the start of its tour through industrial plants in the area. Mr. Redhead explained, "You might call this mobile exhibit a scout car or an infiltration school into the front lines of a drive to drum up business."

Included in the motor coach display were about 450 items, including 222 model castings. There were machine sheared, punched and plated malleable iron items, along with unbroken samples which had been subjected to high stress. Unusual pieces were parts of grave vaults, bomb noses and hair dekinkers.

* * *

TO OBTAIN a quick, permanent record of various types of nonferrous castings produced, so that information will be readily at hand giving details of size and location of gates, risers, etc., with relation to different casting designs, Vaughan C. Reid, vice president, City Pattern Foundry & Machine Co., Detroit, has instituted the use of the new Polaroid Land camera.

Containing no tanks or liquids, the camera produces a finished sepia-

Typical photograph taken with new camera

tone picture 3¼ x 4¼ inches in size one minute after the shutter is snapped. Thus, as soon as a casting comes from the sand a photograph can be made available and it is immediately apparent if the details sought in the picture have been obtained. Also the picture is ready for filing with other data on the casting, avoiding any delay incident to developing and printing conventional photographs.

The camera is of the folding type, weighing a little over 4 pounds and measuring 10½ by 4½ by 2½ inches when closed. It is designed around the use of a special film which processes itself automatically to produce a finished picture as it is advanced through the camera. The eight-exposure film consists of two rolls—one the negative, the other the positive—attached to a single paper leader. Attached to the positive roll and concealed within, are small sealed containers or "pods", one for each picture. Each pod contains a few drops of jellied reagent which is spread between the negative and positive by the action of small steel rollers through which the film passes as it advances into picture position. Interaction of the jelly with the emulsion of the negative layer and the chemicals on the positive sheet carries out the simultaneous development of the negative and printing of the positive.

Shown here is a typical photograph of a medium-size copper casting, taken by Mr. Reid shortly after the casting was shaken out.

FEMA Plans Annual Meeting, Oct. 13-15

A three-day program devoted to subjects of interest to members of the Foundry Equipment Manufacturers Association has been announced by Arthur J. Tuscany, executive secretary and treasurer, for the organization's 31st annual meeting to be held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 13 to 15.

The first day will be devoted to meetings of the various product groups. FEMA president William L. Dean, Mathews Conveyer Co., will preside at the opening meeting Friday morning which will be addressed by Earl L. Shaner, chairman, Penton Publishing Co., and editor-in-chief of *Steel*, Cleveland. Mr. Shaner's talk on "The Climate in Which We Do Business" will cover the current economic outlook as well as long-term social and political trends affecting business. The program also includes a report by the By-laws Committee and the election of directors.

The association's annual dinner will be held Friday evening. Saturday morning's session will include reports on the National Castings Council, Foundry Educational Foundation, the association's Public Relations Committee, and an interpretation of the FEMA business trend reports. Concluding will be an open forum on "Rate of Activity in the Foundry Equipment Industry."

Leon F. Miller, Osborn Mfg. Co., Cleveland, is chairman of the committee in charge of the meeting arrangements.

Book Review

Metals and Alloys, fifth edition, cloth, 214 pages, published by the Louis Cassier Co., and distributed by Iliffe & Sons Ltd., Dorset House, Stamford St., London S. E. 1, England.

This edition represents a complete revision, with a total of some 4600 compositions. The alloys listed are those usually regarded as nonferrous, and are limited to those containing not more than 50 per cent iron.

Fifth in a series of Unusual Grinding Wheel Operations

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Slitting fountain pen nibs to allow for the proper flow of ink is a very exacting operation. This precision job is another example of the versatility of a grinding wheel.

Whatever YOUR grinding problem may be, BAY STATE can solve it . . . fast. Possibly the exact specifications to meet your requirements can be supplied directly from large stocks either in Westboro, branch warehouses, or from our distributors strategically located throughout the United States.

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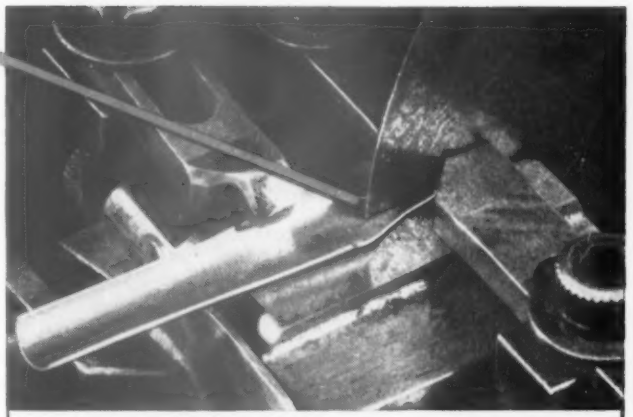

Photograph of Nib Slotting Operation Courtesy of The Esterbrook Pen Company

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Top Performance Consistently Duplicated

FOUNDRY Statistics

Ingot Brass and Bronze

(Shipments in net tons)

	1949	1948
Jan.	19,456	26,998
Feb.	15,026	22,487
Mar.	14,550	24,282
Apr.	10,695	25,177
May	11,114	23,716
June	9,696	24,401
July	10,220	20,456

Source: Ingot Brass and Bronze Industry.

Foundry Production Workers

ESTIMATED NUMBER:

Type Foundry	July 1949	Apr. 1949	May 1948
Gray Iron	88,000	95,100	112,900
Malleable Iron	30,400	31,100	37,300
Steel	61,100	65,400	72,100

AVERAGE WEEKLY EARNINGS:

Gray Iron	$50.80	$51.43	$55.15
Malleable Iron	49.52	51.34	57.21
Steel	57.03	57.86	60.49

AVERAGE WEEKLY HOURS:

Gray Iron	38.6	38.2	39.3
Malleable Iron	33.7	34.5	40.4
Steel	37.5	37.7	41.3

LABOR TURNOVER RATE (MAY)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	2.9	7.0	1.5	4.9
Malleable Iron	2.3	5.6	1.2	4.0
Steel	1.6	6.6	1.0	5.3

Source: Bureau of Labor Statistics.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1948	1949
Jan.	380.9	149.9
Feb.	367.3	144.4
Mar.	326.2	190.8
Apr.	412.0	172.0
May	388.5	121.9
June	376.8	164.9
July	456.3	146.6
Aug.	324.7	...
Sept.	273.5	...
Oct.	296.0	...
Nov.	284.4	...
Dec.	243.7	...

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	12,540,960	7,181,299	.....
1948			
Apr.	1,051,083	584,969	2,690,893
May	992,692	555,728	2,601,626
June	1,072,040	597,624	2,587,081
July	914,464	490,359	2,601,084
Aug.	1,050,948	597,678	2,598,789
Sept.	1,088,051	615,978	2,587,385
Oct.	1,148,422	642,485	2,522,831
Nov.	1,099,827	606,380	2,406,737
Dec.	1,110,512	624,739	2,284,348
Total	12,785,909	7,131,405	.....
1949			
Jan.	1,040,343	573,164	2,064,861
Feb.	986,591	535,163	1,857,403
Mar.	1,074,704	567,041	1,639,465
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266
June	905,573	455,442	1,086,989

Steel

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	1,625,055	1,203,504	.....
1948			
Apr.	150,305	114,896	472,370
May	143,337	111,616	482,531
June	152,894	117,794	469,973
July	120,445	87,927	497,410
Aug.	140,223	107,538	472,481
Sept.	149,222	112,551	447,972
Oct.	152,983	114,819	424,460
Nov.	146,835	110,275	395,013
Dec.	157,395	116,285	354,458
Total	1,760,032	1,335,295	.....
1949			
Jan.	140,577	103,503	338,889
Feb.	135,042	99,425	320,202
Mar.	138,889	102,027	284,754
Apr.	119,953	83,277	250,506
May	106,178	75,537	191,473
June	116,052	84,112	173,237

Malleable

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	895,054	513,228	.....
1948			
May	76,078	42,338	191,553
June	81,747	48,170	178,760
July	64,995	35,018	180,421
Aug.	73,272	41,201	176,824
Sept.	77,815	43,985	164,002
Oct.	81,761	44,305	158,351
Nov.	77,194	42,241	146,422
Dec.	79,882	43,397	137,385
Total	933,265	525,212	.....
1949			
Jan.	71,876	38,040	126,393
Feb.	66,744	35,074	118,318
Mar.	72,052	38,143	102,379
Apr.	61,329	31,728	94,958
May	54,572	27,643	78,944
June	59,597	32,639	69,865

Aluminum

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Die	Unfilled *Orders
1947					
Total	441,996	155,112	174,515	110,538	.....
1948					
Apr.	38,269	12,407	14,563	11,025	78,499
May	33,868	11,854	12,351	9,383	75,219
June	35,822	12,296	13,239	9,843	72,930
July	28,944	9,851	10,504	8,005	70,321
Aug.	32,136	9,883	13,174	8,526	68,334
Sept.	35,877	11,822	13,353	10,218	66,773
Oct.	35,542	11,733	13,216	10,158	65,538
Nov.	34,550	11,410	13,012	9,640	63,767
Dec.	31,836	10,335	11,589	9,290	59,154
Total	424,490	139,781	161,334	118,738	.....
1949					
Jan.	29,142	9,702	10,386	8,490	55,580
Feb.	27,228	9,286	9,339	7,795	52,916
Mar.	27,478	9,348	9,386	7,999	50,508
Apr.	23,801	8,041	8,353	6,876	45,638
May	21,392	7,582	7,293	5,994	41,460
June	23,261	8,668	7,790	6,257	38,159

Copper-base Alloys

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Unfilled *Orders
1947				
Total	1,051,742	960,732	51,139	.....
1948				
Apr.	89,035	80,426	4,705	70,726
May	81,286	72,982	4,910	65,818
June	84,817	76,241	5,148	64,149
July	71,803	64,389	4,670	66,014
Aug.	81,976	73,947	5,018	69,126
Sept.	86,973	78,830	4,999	66,574
Oct.	91,311	82,463	5,293	62,571
Nov.	86,497	77,751	5,107	60,892
Dec.	88,182	79,750	4,796	53,671
Total	1,030,825	930,790	59,009	.....
1949				
Jan.	76,348	68,379	4,593	48,124
Feb.	68,776	61,278	3,951	40,517
Mar.	70,173	62,557	3,927	37,646
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926
June	52,616	47,678	2,552	26,786

Magnesium

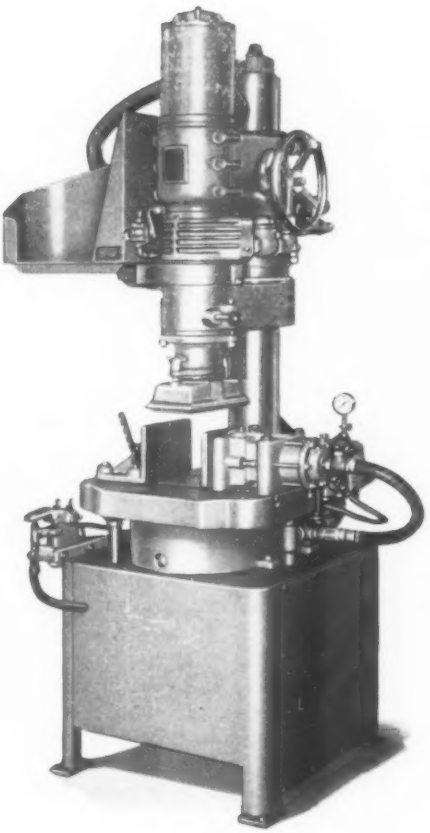
(Thousands of pounds)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	7,693	7,050	.....
1948			
Apr.	673	605	2,640
May	622	542	2,673
June	709	624	2,712
July	554	521	2,684
Aug.	703	655	2,834
Sept.	745	700	3,206
Oct.	708	650	3,070
Nov.	728	683	3,416
Dec.	754	695	3,455
Total	8,214	7,488	.....
1949			
Jan.	822	761	3,821
Feb.	813	756	3,588
Mar.	879	800	3,227
Apr.	726	669	3,234
May	778	726	2,885
June	799	759	3,025

* For sale only.

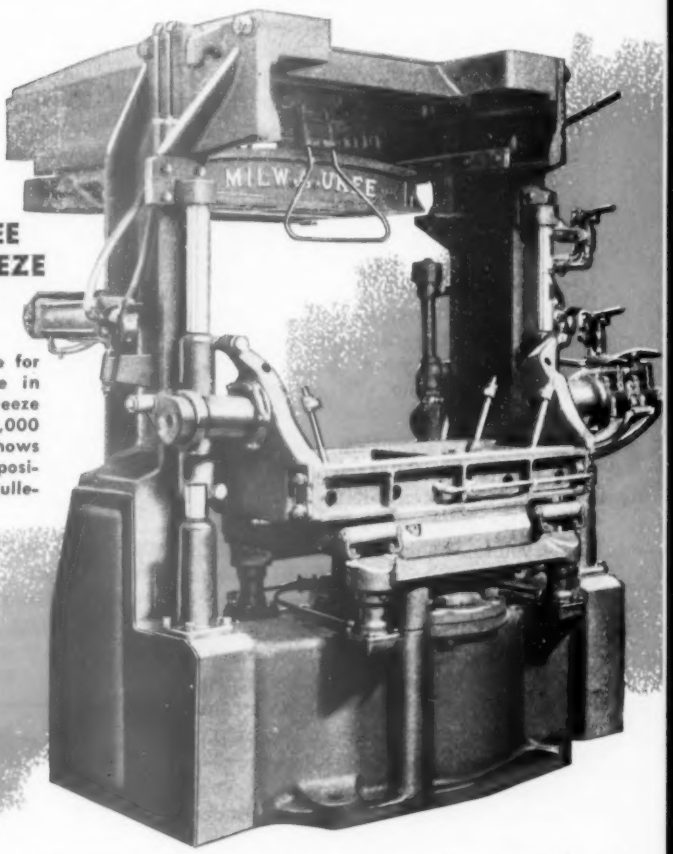
You See Gentlemen, We Really CUT FOUNDRY COSTS with these *Faster Milwaukee Machines!*

Your foundry production records will quickly reveal to you that it pays to use Modern Milwaukee Machines. Take a Milwaukee Jolt Squeeze Rollover Draw, for example. It's an exceptionally fast molding machine, with automatic leveling and smooth pattern draw, combining jolt, squeeze, rollover and draw in the simplest possible operating cycle. All operations are performed in the correct sequence to complete mold before rolling over. Bottom boards are eliminated. Mold is discharged onto a roller conveyor.



NEW DRAW TYPE MILWAUKEE-TACCONE CORE BLOWER

Designed to handle tremendous output of fast production foundries. Boosts blowing pressure 100% to maintain a constant high pressure. 6" draw cylinder in base. Blower is capable of handling green bond cores up to 12 lbs. in size. Explosion-like action. Completely equipped with blowheads and clamp, ready to operate. Bench type core blowers also available. Ask for Bulletin 119A.



MILWAUKEE JOLT SQUEEZE ROLLOVER DRAW

The ideal machine for drags. Available in three sizes with squeeze capacity up to 50,000 lbs. Illustration shows machine in jolting position. Write for Bulletin No. 115.

You want to cut costs to meet stiff competition. Then why not throw your molding and core problems into the laps of Milwaukee Foundry Engineers? They are seasoned foundrymen, familiar with all phases of pattern making, foundry engineering and foundry operation. No obligation involved. Write us today.

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Man-to-Man

ON THE MOLDER'S BENCH

"Things To Do"

By RALPH L. LEE

ONE of the things that cheers me up on my many train and plane rides is looking forward to getting back home and what I'm going to do up in the Lee Hobby Foundry. As I ride along, one idea after another comes to me and as I turn it over in my mind, it seems to breed another until I wonder how in the world I'm ever going to find time to do what I decided to do.

But the funny thing is that when I do get back home I get so thoroughly wrapped up in some one foundry job that all of the things I had decided to do get shoved off till some other time. It just seems that ideas have the cantankerous way of sneaking into your mind at a time when they know you can't do anything about 'em.

With my vacation coming up I decided to spend it cleaning up a lot of jobs I've been putting off throughout the year. So I remembered my early days back there at the National Cash Register Co. in Dayton, where I worked as a youngster. "The Cash" we used to call it.

John H. Patterson, the founder, the president and the Boss supreme, was quite a teacher, a doer and a getter doner. He had a motto for about everything he believed in and he sure did believe in a lot. To encourage everyone else to believe as he did, he had his pet mottos set up in type (not hand lettered), framed and hung up all over the place. You just couldn't look anywhere without your eye landing on a motto. Mother (my better half who used to work at the Cash when I did) just now reminded me that these mottos were also printed on our pay envelopes.

One of the most widespread mottos was expressed in the five-letter word THINK; it was all over the place. Then there was another thing John H. did. He had handy little notebooks and reminder pads printed up and distributed far and wide, not only among the bosses but to almost everyone, the boys on the benches, machines and desks. On the covers and on practically every page he had printed: THINGS TO DO. He maintained that it was a crime and a shame to clutter your mind trying to remember what a cheap little notebook could remember even better, and a still greater crime if you didn't make a note of an idea when you first got it. For as John H. put it, ideas are the life-blood of any business. By the way, I believe he was the first, or among the very first, who held suggestion contests in industry. If I'm not mistaken they still do.

Then I remember this great business teacher reminded us that you can't do everything at once, and that in any list of THINGS TO DO there was sure to be one more important than all the rest—that is, at the time. He said that if you will look over your list of THINGS TO DO and THINK you won't have any trouble deciding which to get at first.

His next warning was that there is always a danger in biting off more than you can chew. He suggested that five items was a good round number to tackle at one time, for any more was likely to scare you into putting all the items off to some other time. Besides, he'd point out we have five fingers on each hand, so we can tuck each item away on each finger to help us get them out of the notebook and into our heads for immediate action. After all, that's the way a good many of us learned to count.

Well the ghost of John H. Patterson haunted me into making a list of the things I had been putting off, with the determination that come what may I was going to clean up the lot during my vacation. Here's the list.

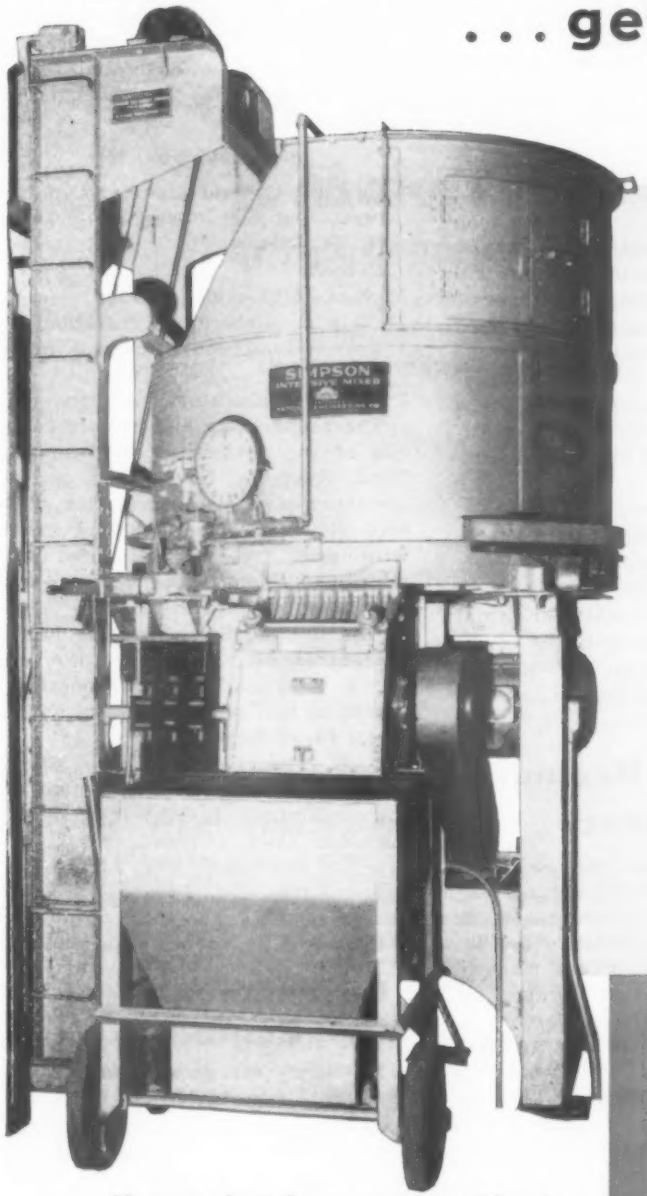
My vacation is about over now and I sure have been putting in the licks. That steel scrap was one big chore —no magnet—hotter than hades— I'd been putting it off to haunt me —but it's all over now. Putting up the stack over the nonferrous furnace was quite a project, particularly figuring out and making the cone on top. It looks swell from the outside; it, together with the stack for the forge and the cupola gives us sort of an industrial skyline when you look at it from the right angle. Oh yes! While I didn't put it on the list, I forged up some iron rings so one crucible handle will take care of my different sizes of crucibles.

Cleaning up the little foundry yard wasn't nearly as bad as I thought it was going to be when I got into it. In fact, it was fun. You'd hardly know the old place now. I expect some of you old-timers would think me silly the way I have my air hose

(*Concluded on page* 152)

Before you buy any Mixer...

...get the answers to these QUESTIONS:



- **What is the *actual* batch size in *pounds* that the mixer will handle on a daily production basis without overloading?**
- **How many tons of *properly prepared* sand will the mixer produce per hour, per day?**
- **How much horsepower is required *per ton* of *properly prepared* sand?**

UNDER today's conditions, the answers to these important questions are more vital to *efficient* and *profitable* foundry operation than ever before. When you use SIMPSON Intensive Mixers, you'll find that the answers are on the *plus* side . . . with more productive capacity, lower initial cost, and less operating cost . . . based on actual operating data secured on the job in hundreds of foundries all over the country.

Shown at the right are actual capacities of some Simpson Mixer models. For more complete data, ask to have a National Engineer present additional facts and figures. Call or write today.

POUNDS PER HOUR OF PROPERLY PREPARED SAND WITH SIMPSON INTENSIVE MIXERS

SIMPSON MIXER MODEL	MAX. HORSE-POWER	BATCH SIZE IN POUNDS	2 MINUTE CYCLE	3 MINUTE CYCLE
No. 2	20	1,500	45,000	30,000
No. 3	50	3,000	90,000	60,000

Complete details on capacities of other Simpson Mixer models will be furnished on request

SIMPSON *Intensive* **MIXERS**

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(*Concluded from page* 150)

rigged, but doggone it, it certainly works swell. I've got a wooden arm sticking out from the wall, on a hinge, with two pulleys on the under side, a heavy cord and a counter weight, so when you let go of the hose it flies right back where it belongs within easy reach for the next time.

Yes sir, everything is in tip-top shape, and I'm ready for visitors, although there are still some things to do. But I've really had a good time, even though each of the items I spent my time on didn't have very much sex appeal as far as interest is concerned. But I found that by adding up all these individually uninteresting items they summed up into a major project, well worth anybody's time tackling and real clean fun licking to a finish.

I guess what I'm trying to say is that there is one whale of a lot of difference between being haunted and hounded by things put off and peace of mind from putting THINGS TO DO in their place (notebook) and taking care of them when their turn comes, without fear or favor. In one case we're slaves and in the other masters. Old John H. Patterson was quite a teacher.

New Booklet by Ralph Lee

Foundrymen who admire the literary efforts of Ralph Lee as presented monthly in THE FOUNDRY will be interested to know that he has written a booklet entitled "Working Together Man to Man." The work has been published recently by the Dartnell Corp., Chicago 40.

As usual, Ralph has done a splendid job. He has accepted the premise that good manners are the key to good relations between shop people, and then has analyzed the situation to see what makes so many people act the way they do. He talks about manners at home, manners in the shop, and gives a good idea of what should be done.

Ralph also discusses "Feeling—the Biggest Single Factor in Pay, Production and Accomplishment." He breaks workers down into three types, the "gotta" workers, the "wanta" workers and the "hard-as-they-can" workers and tells how they get that way. Toward the end of the discussion he enlarges on the thought that people can change, and change as much as they need to change.

Industrial people, all up and down the ladder, should find food for thought in this interesting booklet.

Annual Nonferrous Meeting Is Oct. 14

Non-Ferrous Founders' Society will hold its annual meeting at Netherlands-Plaza Hotel, Cincinnati, Oct. 14. Registration will be held at 9 a.m., followed at 10 a.m. by a membership meeting at which reports of officers and committees will be given, future program recommendations made, and new directors confirmed.

Discussion of national economic and labor policies will be held at the luncheon gathering. The afternoon meeting will be devoted to a discussion of smog elimination and will feature a sound motion picture of equipment and techniques developed by the Los Angeles Non-Ferrous Smog Committee. It will be presented by A. L. Goodreau, G-B Brass & Aluminum Foundry Inc., Los Angeles, who also will lead the discussion.

A cocktail hour will be held at 6 p.m., followed by the annual dinner. Dr. William Dern will speak on the subject "A Parson Takes a Gander."

Plant visitations and the final meeting of the 1948-49 board of directors will be held on Oct. 13. The new board will meet on Oct. 15.

New York Regional Conference

Tentative program has been announced for the New York State Regional Foundry Conference, to be held Friday and Saturday, Nov. 25-26, at the Engineering and Science Campus of Syracuse University, Syracuse, N. Y. The conference is sponsored by the four upstate New York Chapters of the American Foundrymen's Society, namely, Western New York, Eastern New York, Rochester and Central New York, with the co-operation of the College of Applied Science of Syracuse University.

Subjects for the general sessions have been selected for their common interest to the industry as a whole. Tentative program follows:

Friday Nov. 25

9 a.m.—Registration, Materials Engineering Building, Thompson Rd., campus.

9:15 a.m. — Demonstration, Physical Testing Laboratory, nodular iron test bars vs. untreated gray iron bars.

10:30 a.m.—Opening session, Auditorium. Welcome by J. F. Livingston, chairman, Central New York Chapter.

10:45 a.m.—General session. "Nodular Graphite Cast Iron."

1 p.m.—Luncheon, Thompson Road Cafeteria. Chairman, M. J. O'Brien. Speaker, Dr. Montonna, Syracuse University.

2:30 p.m.—Sessions on malleable iron, gray iron, nonferrous and steel.

4 p.m.—General session, Auditorium. Subject: "Motion and Time Study."

7 p.m.—Conference dinner, ball room, Onondaga Hotel. Chairman, L. D. Wright.

Saturday, Nov. 26

9:30 a.m.—General session, Auditorium. Subject: "Sand." Speaker, H. W. Dietert, H. W. Dietert Co., Detroit.

11 a.m.-11:15 a.m.—Recess.

11:15 a.m.—Laboratory visitation.

1 p.m. — Luncheon, Thompson Road Cafeteria.

2:15 p.m.—Laboratory visitation.

The Engineering and Science campus of the university at Thompson Road, Syracuse, N. Y., is a recent development. The laboratories situated there are complete and fitted with latest types of equipment and instruments used in the various fields of modern engineering. Prof. F. R. Morrel and E. Syrene of the Engineering School faculty are developing a program for the laboratory visitation periods that will be of interest to all foundrymen.

E. E. Hook, Dayton Oil Co., Syracuse, N. Y., is general chairman of the conference. L. D. Wright, U. S. Radiator Corp., Geneva, N. Y., is program chairman. J. F. Livingston, Crouse-Hinds Co., Syracuse, N. Y., is secretary.

Government Seeks Engineers

To satisfy the government's needs for highly experienced engineers and scientists, a source file of key engineering personnel is being compiled which will aid in solving a variety of national technical personnel problems. The survey is being managed by a committee of the Engineers Joint Council, in co-operation with the Scientific Personnel Branch of the Office of Naval Research, which serves the National Military Establishment and has liaison with all scientific agencies of the government.

C. E. Davies, secretary of American Society of Mechanical Engineers, is chairman of the survey, and R. A. Wentworth, a member of that organization is survey director. The American Society of Mechanical Engineers is mailing 100,000 questionniares which 18 co-operating societies have addressed for members of professional grade.

SOFFEL'S
THERMOTOMIC

(PATENTED)

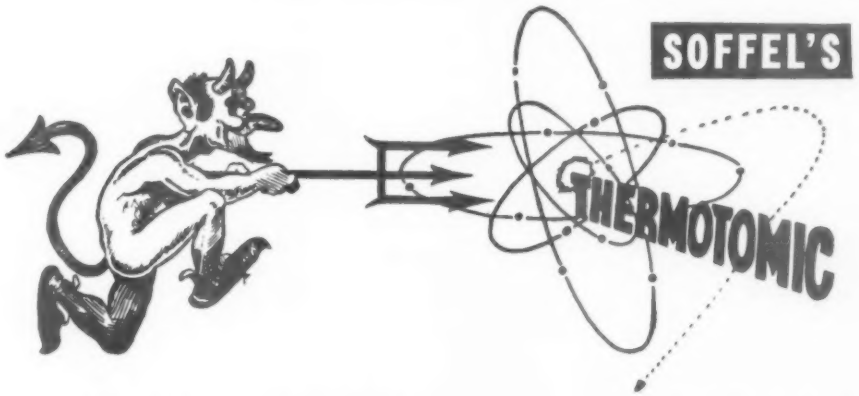
exothermic metal feeding compound

✓ Cuts casting costs

✓ Makes Better Castings

FOR STEEL, STAINLESS STEEL, GRAY OR MALLEABLE IRONS, COPPER, BRASS AND BRONZE

Better castings, more economically produced, result from the use of Soffel's Thermotomic—the exothermic metal feeding compound which keeps feeding metal molten longer. Here specifically are the benefits you get from Thermotomic:



Reduces Sizes of Riser and Feeder Heads

Heads and Risers Removed without Cutting and Burning

Increases Yield

Eliminates Shrinkage and Piping in Castings

What Thermotomic Is

Thermotomic Compound is an exothermic material which can be molded and baked into any desired shapes just as sand cores are made. It produces a temperature of 3500° F. It is used as ring inserts under the risers or feeding heads, or as facing inserts where it is desirable to maintain the fluidity of metal in the mold at those points where rapid cooling may cause piping, shrinkage, or segregation. Great savings are realized through reduced riser dimensions and cleaning costs.

Thermotomic For All Metals and Alloys

The widely different characteristics of metals used in castings require that Thermotomic be available with characteristics which will suit specific metals. Here are the types of Thermotomic and their uses:

Thermotomic WP:

(Waterproofed): For use in green sand molds with any of the above non-ferrous metals. Cores or inserts made of Thermotomic WP may be left in green sand for several hours or overnight without absorbing moisture from the mold. May also be used in dry sand molds.

Standard Thermotomic:

For use in dry sand molds with steel, stainless metals, gray or malleable iron, copper, brass and bronze.

Thermotomic X-235:

Has a double exothermic reaction; that is, after having burned through once, the terrific heat developed serves to set off another chain of chemical reactions within the material causing it to burn again with the development of even greater heat than that produced by the first burning. Recommended when it is desired to maintain temperature of the feeding metal for an unusually long period of time.

Thermotomic ABC:

Aluminum and magnesium may be adequately fed through feeding heads or risers with Thermotomic ABC ring cores placed under feeding heads and ALX-31 Liquidizer on surface of feeding metal in the heads or risers. Thus a reservoir of molten feeding metal will be maintained for a period of 30 minutes or longer. Chills can be eliminated in molds by keeping feeding metal liquid longer than the casting.

Soffel's Carbon-Free Liquidizer Is Recommended for Best Results

Best results and maximum feeding can be obtained from Thermotomic when Soffel's Carbon-Free Liquidizer is used in conjunction with it. The liquidizer, when applied on the surface of the feeding metal in all heads and risers, enters into an exothermic reaction which serves to heat the upper portion of the metal while Thermotomic ring core heats the metal in the lower portion. Carbon-Free Liquidizer also provides an insulating cover which further delays cooling. Other types of Soffel's Carbon-Free Liquidizers are available for conventional feeding heads and ingots. Note: With Thermotomic ABC, use Soffel's AL-X31 Liquidizer.

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We Are The Originators Of Carbon-Free Liquidizers

Pittsburgh Metals Purifying Co.

World's Largest Manufacturers of Fluxes and Purifiers for Ferrous and Non-Ferrous Metals

1352 Marvista St. N. S. **Pittsburgh 12, Pa.**

ACTIVITIES OF FOUNDRY *Groups*

Chicago

MEMBERS of Chicago Chapter, AFS, and guests to approximate total of 1000 converged upon Lincolnshire Country Club in Crete Township, Ill., on Aug. 13 for the annual stag outing and golf. Well planned and conducted, the event was favored by ideal weather.

A goodly number participated in the golf tournament running throughout the day, but for those choosing to take their recreation without too much exertion, several matinee features were provided. These included a horseshoe pitching tournament followed by a pitching exhibition by professionals, and a weight-guessing contest. Refreshments were on tap continuously, interspersed with music and song provided by a quintet during the early afternoon and a trio later in the day.

Interest centered on the Big Top at 7 p.m. where a country fried chicken dinner was served. A generous assortment of prizes was distributed to golf and horseshoe winners and holders of lucky door stubs. Several acts of floor show wound up the program.

Arrangement and direction of the outing was in the hands of the chapter's entertainment committee. Chairman of this group for the second year was Robert M. Jones, superintendent of foundries, South Works, Carnegie-Illinois Steel Corp., while outing secretary of some years' standing was Harry E. Cullen, director of recreation of the same company.

Other members of the committee included: John J. Behan, National Carbon Co.; George J. Biddle, Illinois Clay Products Co.; R. H. Burnell, Federal Foundry Supply Co.; F. B. Flynn, S. Obermayer Co.; J. C. Gore, Werner G. Smith Co.; C. C. Kawin, Charles C. Kawin Co.; T. J. Magnuson, J. S. McCormick Co.; S. E. McGinty, Firegan Sales Co.; N. L. Mooneyham, Trabon Co.; B. A. Patch, Ohio Ferro-Alloys Corp.; H. J. Pfeiffer, Electro Metallurgical Sales Corp.; E. C. Reimann, Wisconsin Steel Co.; H. G. Slichter, Beardsley & Piper Co.; E. W. Smith, Western Materials Co.; H. C. Swanson, Arrow Pattern & Foundry Co.; and H. K. Swanson, Swanson Pattern & Model Works.—*Erle F. Ross.*

CHICAGO NON-FERROUS FOUNDERS' Society held its annual Sadie Sandhog day July 26 at Rolling Green Country club. Lower photo shows the entertainment committee in charge of the affair. Left to right, are: Bill Biedenwag, Harry Swanson, Bud White, and Charlie Leitelt

Chicago Non-Ferrous

CHICAGO Chapter of the Non-Ferrous Founders' Society held its annual Sadie Sandhog day at Rolling Green Country Club July 26. One hundred seventy nonferrous founders and guests, of whom 77 played golf, enjoyed the roast beef dinner and floor show.

The entertainment committee which was in charge of the affair included Bud White, Charlie Leitelt, Harry Swanson and Bill Biedenwag.—*James W. Wolfe.*

St. Louis

ST. LOUIS Chapter of the AFS plans the following program for the balance of the calendar year: Oct. 13—Z. Madacey, Caterpillar Tractor Co., Peoria, Ill., will speak on "Coremaking and Core Blowing." Nov. 10—Clyde A. Sanders, American Colloid Co., Chicago, will speak on "The Side

(*Continued on page* 156)

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DRYING TIME

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SMOOTH CORES

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(*Continued from page* 154)

Floor Molder vs. the Machine." On Dec. 8 the chapter will hold its annual Christmas party.—*Paul E. Retzlaff, Busch-Sulzer Bros. Diesel Engine Co.*

Northeastern Ohio

NORTHEASTERN Ohio Chapter of the AFS opened the 1949-50 season Sept. 8 at Tudor Arms Hotel, Cleveland, with a clambake dinner and the showing of color motion pictures on "Finger Gating" and "Step Gating." The films were prepared by William H. Johnson, metallurgist, and William O. Baker, laboratory mechanic, Naval Research Laboratory, Washington. Mr. Johnson was present to lead discussion.

The films are a continuation of an earlier work, "Gating Systems for Metal Casting," which was shown before the chapter last year, and depict the flow of molten steel at 3000° F in step gating and finger gating systems. The purpose of the study, according to Mr. Johnson, is to attempt to develop better methods of finger and step gating.

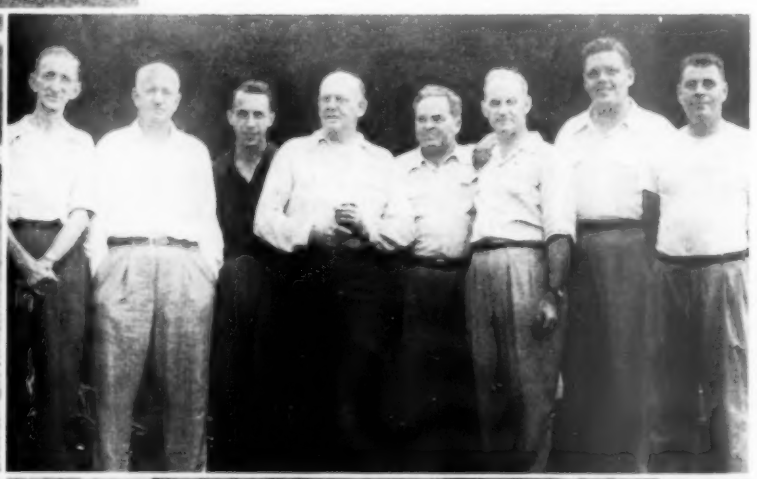
Studies in the film, "Finger Gating," were conducted with finger gating systems having a total finger area twice that of the sprue area. The investigation showed that uniform flow could be secured in finger gates when the total finger area was greater than the sprue area. This was done by using gates that split the fluid stream into equal parts, or that absorbed the momentum of the stream. This absorption of momentum was obtained by bending the runner away from the casting, by using a tapered runner, by designing the runner so as to have the molten metal impinge upon itself, and by using pools on both sides of the sprue as enlargements of the runner.

In the film "Step Gating," studies included the uses of tapered sprues, steps curved downward from the sprue, steps with a common junction and reversed sprues. Three-step gating systems were used in the tests.

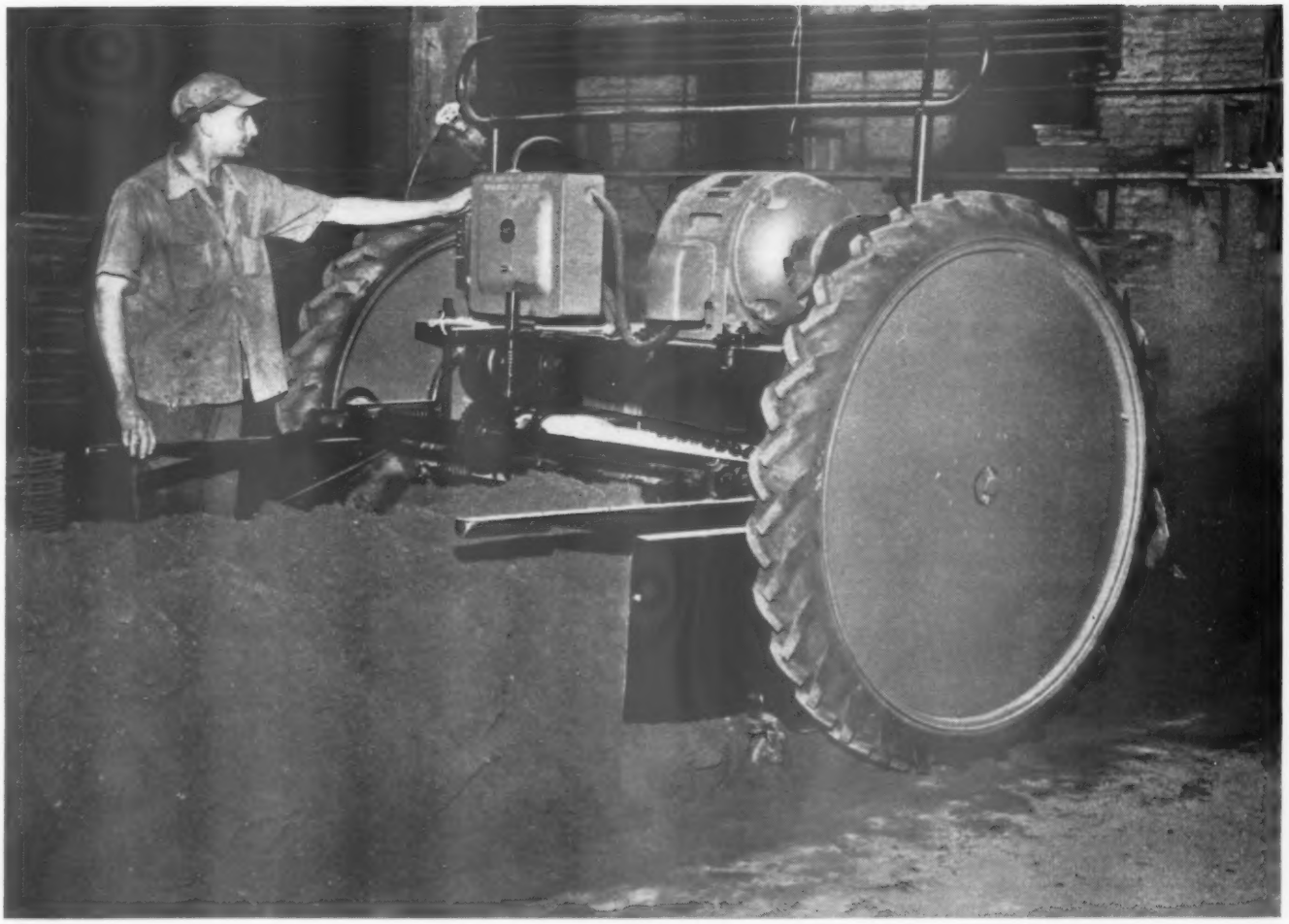
Of the step gating systems examined, two were effective in producing the desired sequence of feeding through the steps. One of these systems employed upturned steps with the bottom step steeply inclined, and the two upper steps radiating from a common junction. The second system utilized the reversed sprue. It consisted of a pool at the bottom of the downgate and a taper in the reversed sprue portion of the system. This gate produced more nearly true sequence flow than any other tried. In addition, it allowed the metal to enter the mold quietly.

During the discussion period, Mr. Johnson pointed out that the method of experimentation used shows only which gates feed and does not show the effect of feeding upon the casting. When asked about the effect of strainer cores on metal flow in various gating systems, he stated that he had not made sufficient tests using them to give a fair indication of results.

(*Concluded on page* 158)



CENTRAL OHIO Chapter of the AFS held its fifth annual outing Aug. 12 at Brookside Country Club, Columbus, O. Pictures taken at the outing are by W. W. White, Jackson Iron & Steel Co.



"The Moulders' Friend" **conditioning more than two tons of sand per minute in a Pennsylvania foundry.**

"The Moulders' Friend" **Fits Your Foundry.** Carried on two large pneumatic tired wheels, it rolls easy and turns short in the crowded foundry under the complete control of one man—No experience required to operate—Saves labor shoveling.

"The Moulders' Friend" **Improves the Condition of Your Sand Heaps.** The brush does the job. Thousands of flat tempered steel wires in the brush revolving at high speed pick up small particles of the used sand, added bond and moisture and blend them thoroughly. The action is so thorough that clay bond and water can be blended with the sand in one trip over the heap.

"The Moulders' Friend" **conditions *all* the heap.** As it travels over the heap it gathers *all* of the sand from the floor, pulverizes the lumps and blends it thoroughly, avoiding the layer of dry, unconditioned sand sometimes found next to the foundry floor.

"The Moulders' Friend" **Is Easy to Buy and Maintain.** Simplicity of construction with few moving parts keeps down original and replacement costs. High speed chain drives run in dirt proof, oil tight cases.

If you want satisfied moulders making quality castings, investigate this remarkable machine. Write us now.

"The Moulders' Friend", **Dallas City, Ill.**

(*Concluded from page* 156)

He also was asked what effect the basin and plug method of pouring used in the tests had on the step gating systems studied. In answering, he said that slow pouring will make almost any step gate work properly. Consequently, the basin and plug pouring method was used to obtain a rather fast and steady state of pour so that only properly designed gating systems would work satisfactorily.—*Robert H. Herrmann.*

Central Ohio

APPROXIMATELY 200 members and guests of the Central Ohio Chapter of the AFS met at Brookside Country Club, Columbus, O., on Aug. 12 to participate in the chapter's fifth annual outing. Afternoon activities centered around golf, bait casting, baseball and dart throwing. With the exception of one unfortunate group of golfers, everyone was successful in finding shelter from an unscheduled downpour which thoroughly soaked the ground. Evening activities began with a chicken dinner and the awarding of approximately 80 door prizes ranging from fishing reels and golf balls to sport shirts and thermos bottles. The outing was concluded with an hour and a half of professional entertainment.

Credit for the success of the affair belongs to the picnic committee under the chairmanship of Jack Schram, Swan-Finch Oil Corp., and to the generous friends of the chapter who contributed to the door prize list.—*H. W. Lownie Jr., Battelle Memorial Institute.*

Wisconsin

THE season's first dinner meeting for the Wisconsin Chapter of the AFS was held Sept. 9 at the Hotel Schroeder, Milwaukee, with 190 members and guests present. The technical program comprised four sectional sessions devoted to the following subjects:

The steel group was addressed by Theodore Redin, Wm. Demmler & Bros., on "Core Blowing in the Steel Foundry," with V. E. Ziemer, Maynard Electric Steel Casting Co., as chairman for the group.

The scheduled speaker for the gray iron and technical group, Frank S. Brewster, Harry W. Dietert Co., Detroit, was prevented by transportation difficulties from being present to discuss, "Behavior of Sands at Elevated Temperatures." Joseph Gitzen, Delta Oil Products Co., served as pinch-hitter, and with his knowledge of sands, had no trouble in keeping his audience interested for more than an hour, with questions fired at him by members after his talk. G. P. Antonic, Walter Gerlinger Inc., was chairman for this section.

For the malleable iron and pattern group, Frank Harris, Belle City Malleable Iron Co., chose for his subject, "Pattern Gating for Malleable Castings." Harry Arneson, Spring City Pattern Works, was the chairman.

The nonferrous group heard Earl Woodliff, Foundry Sand Service Engineering Co., Detroit, talk on "Sand and Sand Binders for the Nonferrous Foundry," with Duane Bosma, Bucyrus-Erie Co., acting as chairman for the group.—*John E. Hubel.*

Gray Iron Founders Plan Meeting

Gray Iron Founders' Society will hold its 21st annual meeting at the Edgewater Beach Hotel, Chicago, Oct. 27 and 28. The tentative program for the meeting is as follows:

Thursday, Oct. 27

8:30 a.m. — Registration, Michigan Room foyer.

10:15 a.m.—Business session, Michigan Room. Remarks by the president and committee reports.

12:30 p.m.—Industry luncheon, Crystal Ballroom. Presentation of retiring board of directors. Everett M. Dirksen, Pekin, Ill., will speak on "Must We Control Bigness in Government?"

4 p.m.—Committee meetings.

5:30 p.m.—Social hour. Refreshments in west lounge; buffet supper in ballroom.

Friday, Oct. 28

9 a.m. — Registration, Michigan Room foyer.

10 a.m.—Business session, Michigan Room. The following men will speak:

Frank R. Elliott, foundry superintendent, Westinghouse Electric Corp., Springfield, Mass. "Will Foundry Mechanization Pay Off?"

Lee Shaw, Seyfarth, Shaw & Fairweather, Chicago. "Provisions of Labor Contracts."

Edward Marker, vice president, Fuller & Smith & Ross Inc., Cleveland. "So You Want to Increase Sales?"

James I. Banash, safety consultant, Chicago. "Safety Begins With Top Management."

Reports of management group chairmen.

12:30 p.m.—Industry luncheon, Crystal Ballroom. Introduction of new officers and directors. Presentation of citations and awards.

Col. Jack Major will speak on "Taxes, Women and Hawgs."

Malleable Castings Subject of Manual

One of the most complete manuals ever prepared by a producer of castings has recently been published by the Lake City Malleable Co., Cleveland. Titled "Shock Proof" after the Lake City trade name, the 92-page manual is more than sales literature describing the company's products. Actually it does a selling job for the malleable iron industry as a whole by going into considerable detail concerning the properties, applications and design of malleable iron castings.

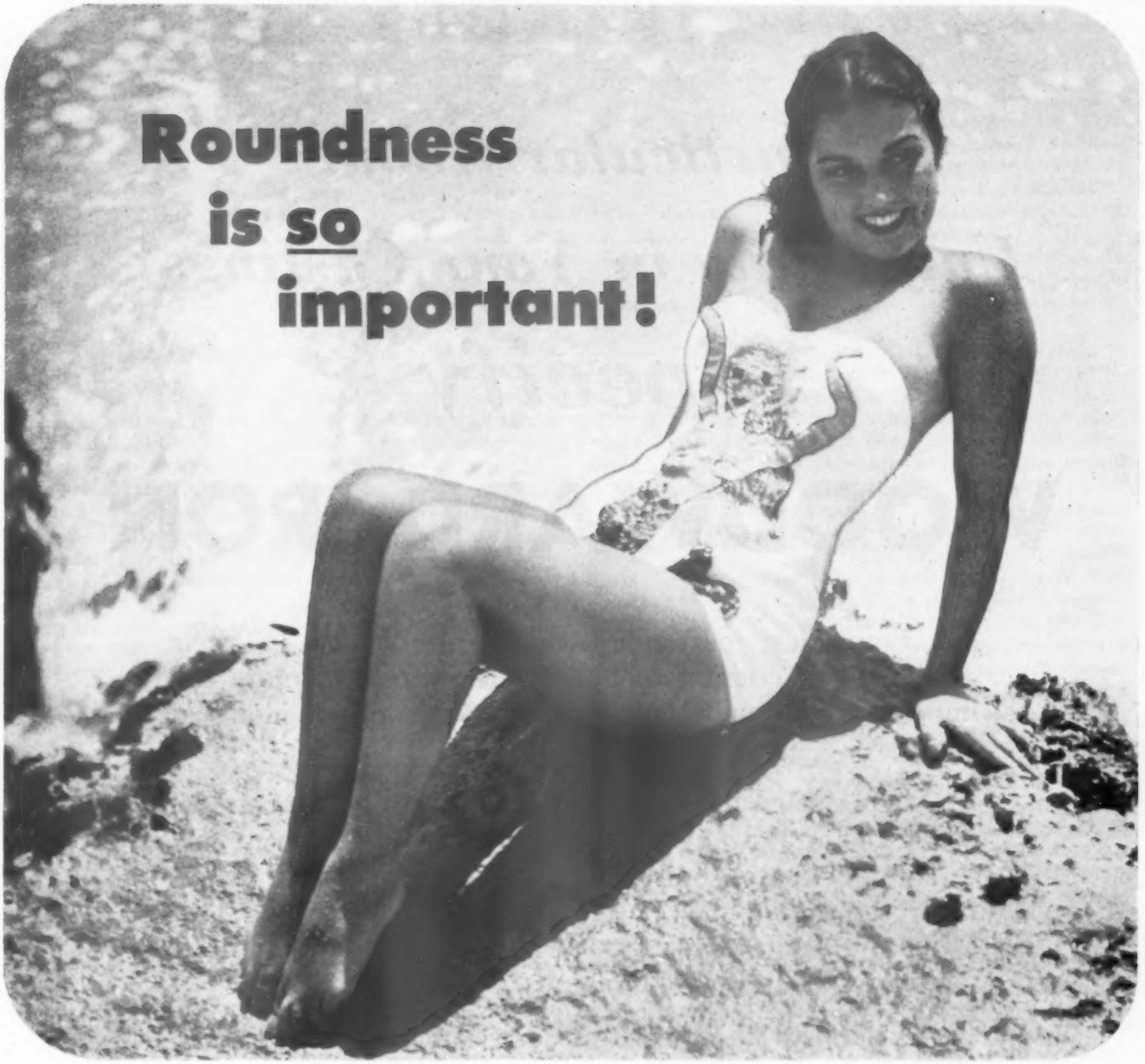
The manual contains all of the information required by the casting user to determine the adaptability of his products to malleable iron castings, together with recommendations for the correct design of the castings, their pattern requirements and subsequent machining or other finishing operations.

An exceptionally attractive format, incorporating an unusual method of presenting the various points under discussion, should make the manual interesting as well as instructive reading for the designer, engineer and student.

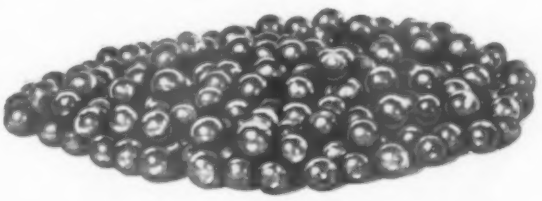
50th Anniversary

This year marks the 50th anniversary of the Timken Roller Bearing Co., Canton, O. While engaged in the carriage business in St. Louis, Henry Timken worked out the first drawing of the tapered roller bearing, which he patented in 1898. The following year his sons, William R. and Henry H. Timken, formed the Timken Roller Bearing Axle Co., and in 1901 started construction of the first plant in Canton.

Since that time Timken bearings have been applied to every kind of machinery where rolling friction is a problem. The company now has plants in Canton, Columbus, Zanesville, Mount Vernon, Wooster, Zoarville and Bucyrus, O., Colorado Springs, Colo., and St. Thomas, Ont., Canada. In the 50 years since the first Timken tapered roller bearing was built and installed on a carriage axle, some five billion bearings, ranging in weight from two ounces to over 9,000 pounds, have been made for use in all types of industrial machinery.



Forgive us for using glamour (Miss Jean Cambron, one of Cleveland's loveliest) for the very obvious reason of getting you to read our advertisement. But you see, it's so necessary that you learn about ANNEALSHOT. Foundrymen have always taken shot and grit pretty much for granted. Now there's a new kind of shot—a much better shot—and you should know about it.



ANNEALSHOT is more uniformly round and completely free of foreign material. So right off, you know it will produce a more uniformly beautiful finish, with less wear on your equipment. It's annealed by a special process developed by METAL BLAST, which toughens and hardens the shot—but doesn't make it brittle. You'll get 15% longer life from ANNEALSHOT, more efficient cleaning and peening, a better finish in less time—yet it costs no more than ordinary shot. Worth a trial, don't you think? While it's fresh on your mind—why not send an order today, to METAL BLAST, INC., 872 East 67th Street, Cleveland 3, Ohio.

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Particular About Uniformity in Your Castings?

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WOODWARD IRON

Foundries, particular about uniformity in their castings, are coming to appreciate more and more the importance of using pig iron made from an identical base ore.

Woodward Iron's consistent uniformity in chemical constituents and physical properties is due in large part to the fact that Woodward's base ore burden is always from the *same ore body*—its own mines in the Red Mountain range—plus the use of an air conditioned blast to reduce and control moisture.

Establish Woodward as your source of supply and see for yourself how it will help you standardize precise control of quality in the production of your castings.

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READERS' COMMENT • • •

Phosphor-copper Additions

TO THE EDITORS:

May we refer to page 134 of THE FOUNDRY for June, 1949 where, in the third column under the heading of "Phosphor-Copper in Paper Bags," Mr. Decker explains a method whereby he regulates the supply of phosphor-copper to his foundry by issuing it in pre-weighed amounts packed in paper bags.

I feel sure it will interest your readers to know that, for the very reasons mentioned by Mr. Decker, we have introduced in this country pure copper tubes filled with pre-weighed quantities of phospor-copper. Similar tubes are also available with other deoxidants, such as magnesium, boron, etc., for use on nickel and other metals. A leaflet is available giving details of these tubes.

They are universally used in most British foundries and have been found a simple and foolproof method of introducing the correct amount of deoxidants.

I should like to add that these tubes are now available in the United States through our associates, Foundry Services Inc., 280 Madison Ave., New York 16.

E. WEISS
Director

Foundry Services Ltd.
Long Acre, Nechells
Birmingham 7, England

* * *

Carbon in Nodular Cast Iron

TO THE EDITORS:

Since the July issue of THE FOUNDRY in which appeared our article, "Determination of Total Carbon in Pig Iron, High Carbon Iron and Nodular Cast Iron," we have found that any drilling of a nodular cast iron to determine the total carbon causes the result to be low. When the nodular iron is drilled some carbides present give off a carbonaceous gas which causes the the low result. The drillings smell strongly of acetylene, which is the usual reaction of some metallic carbides with the moisture of the air.

Since the above-mentioned paper we have been determining the carbon on solid pieces of the material. For a 2 x 1 in. test bar, we cut a cross section of the bar about $\frac{1}{8}$-in. thick. The cross section is then cut in half, one of which is divided into five parts, numbering them 1 through 5, No. 1 being the outside of the bar and No. 5 being the center. We determine the total carbon from these pieces. Pieces 2 and 4 are used for graphite determination.

Whenever a test bar is not available we use solid pins $\frac{1}{8}$-in. in diameter in pieces weighing about 1 gram. Where we have had both pins and bars the two analyses will give reasonable checks.

Listed in the accompanying table are results of nodular cast iron bars by both methods, that is, drilling and solid pieces. The first three bars were used in our previous paper.

In conclusion, to determine total carbon on nodular graphite cast iron, we recommend use of solid pieces instead of drillings.

ROY E. DEAS
Chief Chemist

American Cast Iron Pipe Co.
Birmingham

* * *

More About Graphitization

TO THE EDITORS:

With reference to Dr. Schwartz's comments on my paper (THE FOUNDRY, August), I make the following remarks:

Dr. Schwartz points out that the amount of aluminum present in the ferroboron may be too low to be responsible for the accelerated graphitizing effect of ferroboron additions.

However, when the boron has been added as boron carbide, no graphitizing influence has been recorded. The ferroborons used have contained 10-15 per cent boron and 5-8 per cent aluminum and frequently other deoxidizing elements such as titanium which may also have a slight graphitizing effect. The addition of boron as boron carbide has resulted in an increase in nodule number, but this has not been accompanied by an increase in the rate of graphitization, similar to that obtained when using ferroboron addition.

In fact, even in very small amounts, boron-carbide additions appear to have a slight carbide stabilizing effect.

On the other hand, confirming to some extent Dr. Schwartz's point, additions of aluminum of the same order as those introduced with additions of ferroboron, have not given an equivalent increase in the rate of graphitization.

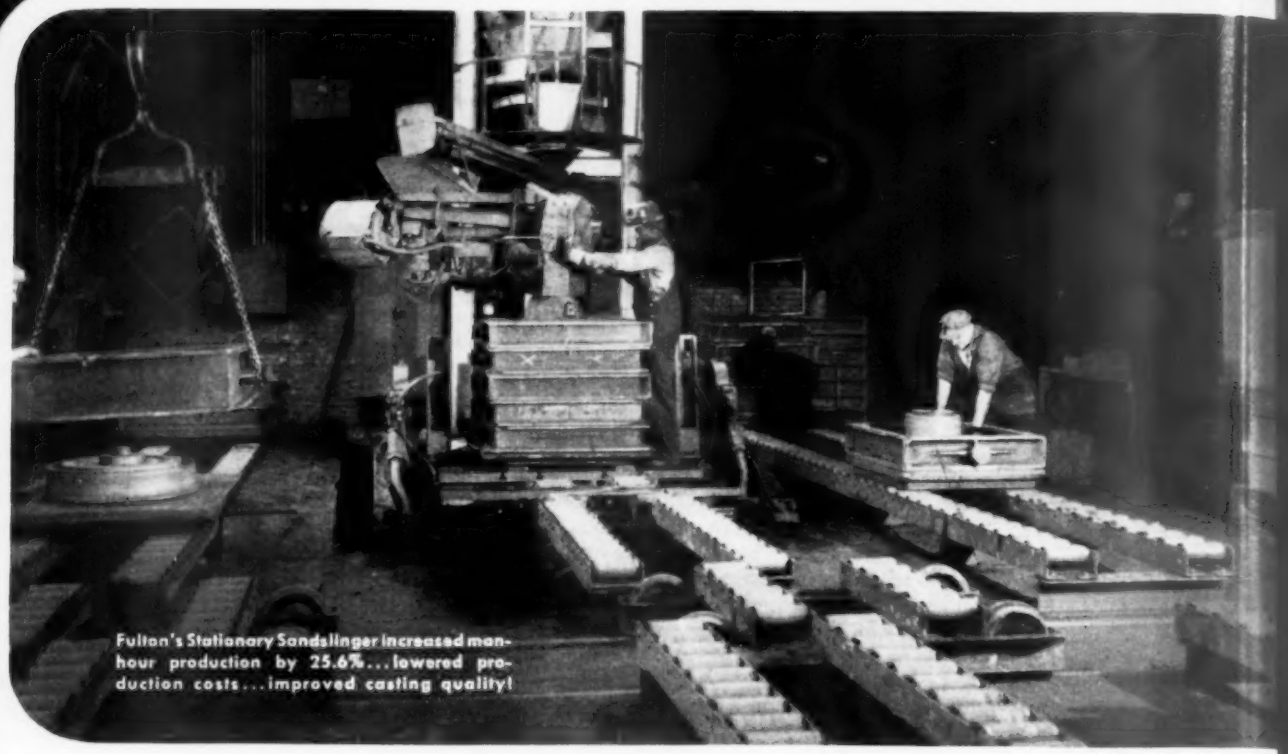
Clearly, as Dr. Schwartz has implied, further experimental work needs to be carried out to resolve an issue which is at least of profound theoretical interest. Frankly, the writer fails to see what practical advantages ferroboron additions have over additions of aluminum, which can also increase graphization rate and nodule number, without the inherent dangers of an overdose of boron.

With regard to the effect of prequenching, Dr. Schwartz is incorrect in assuming that the author believes that prequenching alters the distribution of sulphide particles. There is certainly no direct evidence to substantiate this view, but it cannot be entirely discarded. Earlier in the paper the author had pointed out the influence of sulphur on the type of graphite nodule formed and that sulphide particles can frequently be seen at the centers of graphite nodules. If sulphide particles do function as nuclei for graphitization in all

(*Continued on page* 164)

Nodular Graphite Carbon Determination Drillings Against Solid Pieces

Drillings				Solid Pieces			
Bar No.	Size of Sample in Grams	Carbon %	Calc. Avg. Carbon, %	Bar No.	Size of Sample in Grams	Carbon, %	Calc. Avg. Carbon, %
2804	1.000	3.36		2804	.848	3.59	
	1.000	3.56	3.56		.781	3.70	3.68
	1.000 (all of drilling)	3.78			.787	3.72	
2740	1.000	3.70		2740	1.523	4.23	
	1.000	3.74	3.78		1.599	3.93	3.97
	1.000	3.78			1.604	3.79	
	.073	4.91					
2758	1.000	3.18		2758	1.000	3.38	
	1.000	3.16	3.17		.907	3.38	3.35
	.579	3.19			.862	3.32	
2724	1.000	3.55		2724	1.186	3.71	
	1.000	3.53	3.73		1.430	3.62	3.63
	.763	4.26			1.326	3.57	
2762	1.000	3.30		2762	1.364	3.52	
	1.000	3.36	3.36		1.018	3.49	3.48
	.920	3.40			.872	3.44	
2750	1.000	3.31		2750	.891	3.38	
	1.000	3.25	3.29		.808	3.39	3.39
	.696	3.31			.766	3.39	
2746	1.307	3.57	3.61	2746	1.302	3.69	
	1.314	3.65			1.044	3.85	3.74
					1.119	3.72	



Fulton's Stationary Sandslinger increased man-hour production by 25.6%... lowered production costs... improved casting quality!

SANDSLINGERS

Finishing the molds rammed by the Stationary Sandslinger. Empty flasks are placed on one of the two roller conveyors at either side for return to the Sandslinger (in background).

The Motive Jr. Sandslinger rams molds of varying heights, widths and lengths... with speed, hardness and uniformity. Its flexibility makes it ideal for a jobbing foundry.

The Motive Jr. Sandslinger at Fulton quickly rams large pit and floor molds on both sides of its track and cuts ramming time to a fraction of that previously required.

at FULTON FOUNDRY...

...INCREASE MAN-HOUR PRODUCTION BY 25.6% AND THEREBY REDUCE MOLDING COSTS!

Fulton Foundry and Machine Co., Cleveland, Ohio, was one of the first to operate a Motive Type Sandslinger. Now, after thirty years, during which they have used both Sandslinger and molding machines, Fulton has installed two modern Sandslingers to do all of their ramming. Their Motive Jr. rams pit and floor molds up to fourteen foot square, on both sides of its 180 foot track. Their Stationary Sandslinger, with Raising and Lowering Arms, rams high molds on a rollover machine and lower molds on two roller conveyors. They have found Sandslinger ramming the only effective and practical method for their foundry.

With Sandslinger ramming Fulton has effected a 25.6% increase in man-hour production over the former machine molding method, with a corresponding reduction in molding costs. Sandslingers will do the same for you. Let B&P engineers make a survey of *your* foundry—write us today.

BEARDSLEY & PIPER

Division of

PETTIBONE MULLIKEN CORPORATION

2424 North Cicero Avenue, Chicago 39, Illinois

Beardsley & Piper are manufacturers of the Sandslinger • Speedslinger • Hydra-Slinger • Speedmuller • Mulbara • Screenarator • Nite-Gang • Junior Nite-Gang • Preparator • B&P Champion Speed-Draw • B&P Plate Feeder • B&P Turntable • B&P Gyratory Screen

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COMPLETELY ILLUSTRATED!
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THE NITE-GANG
FOR COMPLETE SAND CONDITIONING
on a new machine
SEND COUPON FOR COPY
ANOTHER BETTER METHOD by BEARDSLEY & PIPER
the NITE-GANG

Completely conditioned sand at lowest cost per ton with the revolutionary new Nite-Gang! An outstanding development in sand conditioning equipment, this mobile self-feeding machine blends, magnetically separates, screens, double aerates and windrows or piles the sand. The Nite-Gang entirely eliminates all of the laborious manual operations formerly involved in the floor cutting of foundry sands and provides complete, effortless conditioning of up to forty tons of molding sand an hour. ***The coupon below will bring the 12 page Nite-Gang bulletin containing full information on this new machine.***

send coupon now!

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Division of Pettibone Mulliken Corporation
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☐ Send Nite-Gang Bulletin ☐ Have B&P Representative Call

FOUNDRY _____

ATTENTION _____

TITLE _____

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CITY _____ ZONE _____ STATE _____

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(*Continued from page* 161)

cases, it could follow that prequenching refines or redistributes the sulphide particles.

This latter would seem improbable, as Dr. Schwartz has suggested. However, if sulphide particles are not nucleating the graphite nodules, by what mechanism do these particles influence the type of graphite nodule formed? If free iron sulphide is present, nodules of the spherulitic type are produced whether the metal is prequenched or not. If no free iron sulphide is present, nodules of the flake aggregate type are produced whether the metal is prequenched or not.

In both cases, prequenching increases the nodule number considerably.

It is felt that the influence of the sulphide particles on the type of graphite nodule produced is fundamental to the whole problem of graphitization of malleable cast iron and, except for the work by Morrogh and Palmer, this aspect has been largely overlooked. American malleable iron usually contains sulphur with the manganese sulphide structure, and American considerations of graphitization theory have tended to ignore the relation between sulphur and the structure of the nodule.

The author agrees that there is considerable evidence that graphite nodules in malleable iron originate at the austenite cementite interfaces, and Dr. Schwartz's suggestion that prequenching may increase the area of interface, would appear to be quite plausible and must be considered as one possible theory explaining the increased number of nodules resulting from prequenching.

H. G. HALL
Director

Castings Ltd.
Walsall, England

* * *

Another Hobby Foundryman

TO RALPH L. LEE:

For quite some time I have felt a strong urge to write you a personal letter concerning your articles entitled, "Man-to-Man on the Molder's Bench." I judge you are a busy man and I thought you might not appreciate having your time taken up reading sentimental letters. However, the last one appearing in THE FOUNDRY, "Bitten by the Foundry Bug," has changed my mind.

To me this article is especially interesting as your description of your little hobby foundry together with the human interest angle makes it complete and well balanced.

The reason for my interest is that it so closely parallels my own ex-

perience, except that I got started much later in life and had no one to help me, so I am eager to read everything than I can get on the subject.

My little foundry was started as a hobby but sometimes proves convenient to furnish castings for my machine shop. My foundry equipment was largely built in my own machine shop from scrap materials. My cupola is 16 in. inside diameter and I have about 1 cu yd of molding sand. I use a coke-fired furnace and crucible for melting aluminum and brass. The pattern department is located in one corner of the machine shop and the core department in a corner of the foundry.

My plans are to mechanize as far as will be practical. I hope to build a hand-operated molding machine, a small traveling crane and pouring equipment and a power-operated sand cutter.

My chief trouble with gray iron is machinability. I am located in a small village and too far from industrial centers to obtain materials in small quantities, so I use all scrap.

I must close now as I did not intend to let this get this long. I will be watching for more of your articles in the future.

CLARENCE R. CLOUGH
Clough Machine Shop
Donnellson, Ill.

* * *

Induction Melting of Zinc

TO THE EDITORS:

On page 96 of your September, 1949 issue we find your interesting reply to a customer who requested information about some of our furnaces for melting zinc alloy.

We take this opportunity to inform you that our induction furnaces have been used successfully in many foundries for such purposes.

MANUEL TAMA
Vice President

Ajax Engineering Corp.
Lalor and Hancock Sts.
Trenton, N. J.

* * *

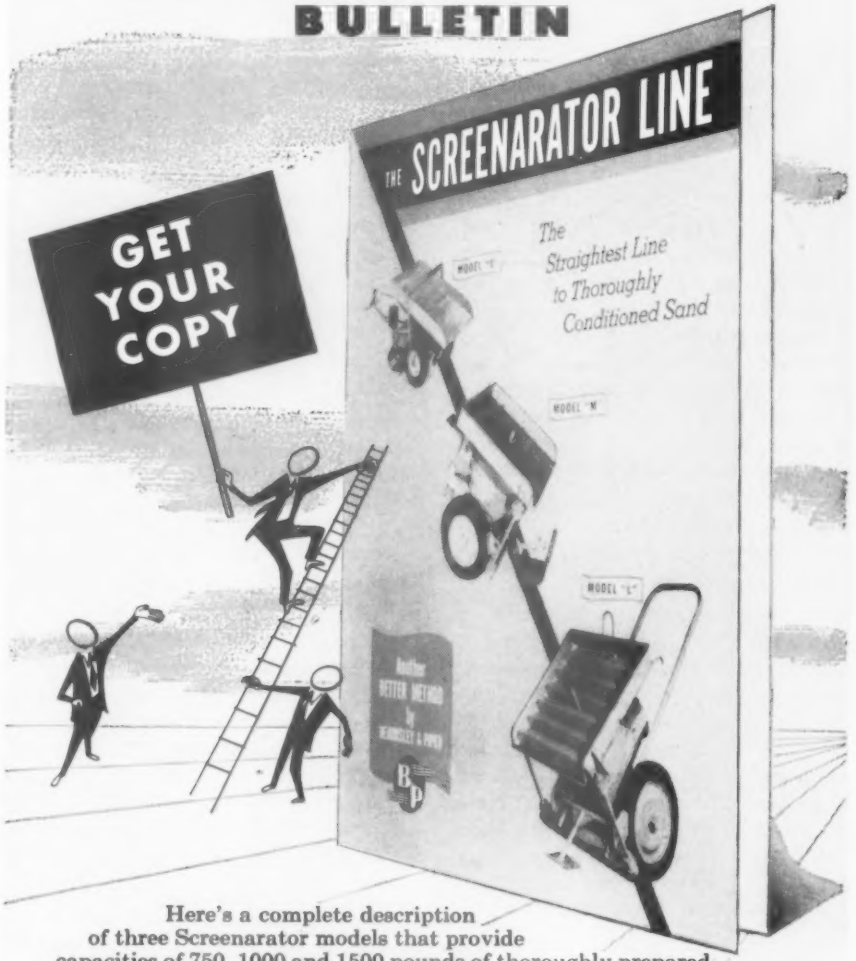
Locates Correspondent Here

TO THE EDITORS:

May I extend to you my sincere thanks and appreciation for running my letter in THE FOUNDRY. I have established contact with a young metallurgist in your country as was my wish.

GERALD H. STEVENS
12, Belle Vue Grove
Grove Hill, Middlesbrough
Yorkshire, England

NEW
SCREENARATOR
BULLETIN



Here's a complete description of three Screenarator models that provide capacities of 750, 1000 and 1500 pounds of thoroughly prepared sand per minute. The Screenarator line is engineered to produce screened, double aerated, lump free, fluffy sand . . . at lowest initial investment and lowest cost per hour of machine operation.

All types of foundries—ferrous and non-ferrous—production and jobbing, use Screenarators to meet their needs for thoroughly conditioned sand. Castings produced in screenarated sand are of the highest quality and finish.

Regardless of the size or type of foundry, the Screenarator pays for itself in a short time. The coupon below will bring you the new Screenarator bulletin or details on free trial use of the Screenarator.

SEND COUPON TODAY!

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Division of Pettibone Mulliken Corp.
2424 North Cicero Avenue, Chicago 39, Illinois

☐ Send Screenarator Bulletin
☐ Send details on free trial use of the Screenarator

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INDUSTRY Briefs

W. H. BUTTERWORTH & Sons Co., Philadelphia, textile machinery manufacturer, is starting construction of a gray iron foundry, 200 x 400 feet, at its plant at Bethayres, Pa., a suburb. Scheduled for operation in March, it will replace the existing 100 x 300-foot foundry, thus providing increased capacity and more modern facilities. It will produce castings up to 10 tons in size. The company also will build a machine shop addition at Bethayres. The new program will cost about $500,000.

* * *

Bingham-Herbrand Corp., Toledo and Fremont, O., has acquired the assets of Superior Mfg. Co., 1302 Ontario St., Cleveland 13, manufacturer of compressed air tools and equipment. Superior will be operated as a part of the Herbrand Division with J. E. Terry, who has been associated with Superior since its founding in 1932, as general manager.

* * *

H. K. Porter Co., 1932 Oliver Bldg., Pittsburgh 1, has purchased the plant, assets, stores of products and assumed the liabilities of Jarecki Mfg. Co., 1345 West Twelfth St., Erie, Pa. Operations of the Jarecki company foundry will be discontinued.

* * *

Russell F. Lincoln & Co., 1058 Maplecliffe Dr., Lakewood 7, O., have been appointed representatives in northern Ohio for Metallizing Co. of America, Chicago.

* * *

A & B Pattern Works, Michigan City, Ind., owned by Alan Baines, has discontinued operations.

* * *

Hamilton Facing Mill Co., 249 Hess St. N., Hamilton, Ont., has been purchased by Reg. M. Littlejohn, for many years sales manager of the Wm. R. Barnes Co., Hamilton. In addition to the regular lines of seacoal, pitch and graphites, the Hamilton company has been made Ontario representative for Eastern Clay Products Inc, Jackson, O.

* * *

Hobart Bros. Co., Troy, O., has appointed J. E. White, 1802-1808 South Seventh St., St. Louis, distributor for its line of arc welding equipment, accessories and electrodes, in part of Missouri and western Illinois. Mr. White will operate under the name of Hobart Welder Sales & Service.

* * *

Lead Alloy & Chemical Mfg. Corp., 1923 Westwood Ave., Cincinnati 14, has been organized by William and Clifford Waller, who will operate as suppliers of metals including copper, brass, bronze and aluminum ingot, metallic cleaners and fluxes, and allied products.

* * *

Morris Bean & Co., Yellow Springs, O., has awarded a contract for the construction of a new 60,300 square foot aluminum foundry, to H. K. Ferguson Co., Cleveland, industrial engineer and builder.

* * *

Milwaukee Chaplet & Mfg. Co., Milwaukee 15, has been appointed Wisconsin distributor for the Bay State Abrasive Products Co., Westboro, Mass.

* * *

Nash-Christian Foundry Supply Co., 44th St. & Powell Ave., Birmingham, manufacturer of foundry facings, was destroyed by fire Aug. 11.

* * *

L. S. Starrett Co., Athol, Mass., has purchased the Burrill Saw & Tool Works, Ilion, N. Y., manufacturer of band knives and band saws, and is manufacturing these products at the Athol plant and marketing them under the Starrett name through Starrett distributors.

* * *

West Allis Grey Iron Foundry, 5116 West Lincoln Ave., Milwaukee, has discontinued operations, and the plant has been purchased by Allied Smelting Co., which has moved its operations from Minneapolis to the Milwaukee plant.

* * *

Sturgis Products Co., Sturgis, Mich., has changed its name to the Roto-Finish Co., and has moved all sales and manufacturing to its new plant in Kalamazoo, Mich. The company manufactures equipment and processes for mechanical finishing.

* * *

Tamms Silica Co., 228 N. LaSalle St., Chicago, has changed its name to Tamms Industries Inc., effective Aug. 1. The announcement states that the new name better reflects the various activities in which the company engages.

* * *

Eastern Foundry Supplies Inc., 500 Chancellor Ave., Irvington 11, N. J., has been appointed exclusive sales representative for fluxes by the American-British Chemical Supplies Inc.

* * *

Metal & Thermit Corp., 120 Broadway, New York 5, has added temperature-indicating products to the line of welding accessories it distributes for Tempil Corp., 132 West 22nd St., New York 11.

* * *

Central Foundry Division, General Motors Corp., Saginaw, Mich., is expanding the coreroom and shipping department of its Danville, Ill., gray iron foundry, by approximately 20,000 sq ft of floor space.

* * *

Southern Wheel Co. Division of American Brake Shoe Co. has closed its Atlanta plant. The division's Sayre, Pa., plant was closed early this year. Both closings had been contemplated for some time.

* * *

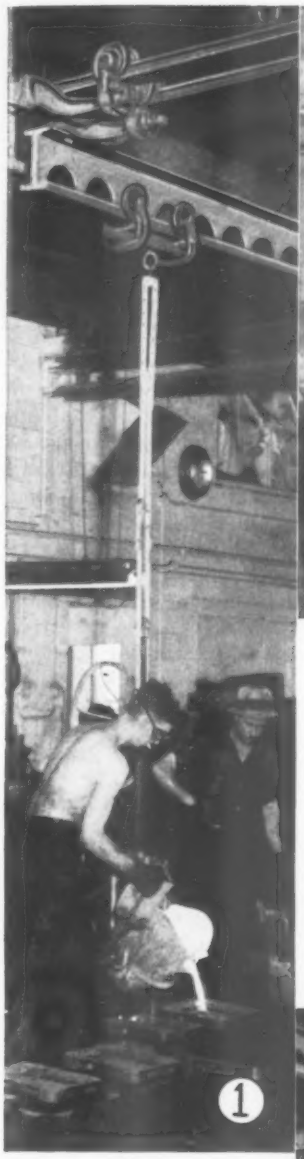
Oakland Foundry Co., "A" St. & Florida Ave., Belleville, Ill., suffered damage estimated at $200,000 in a fire Sept. 4.

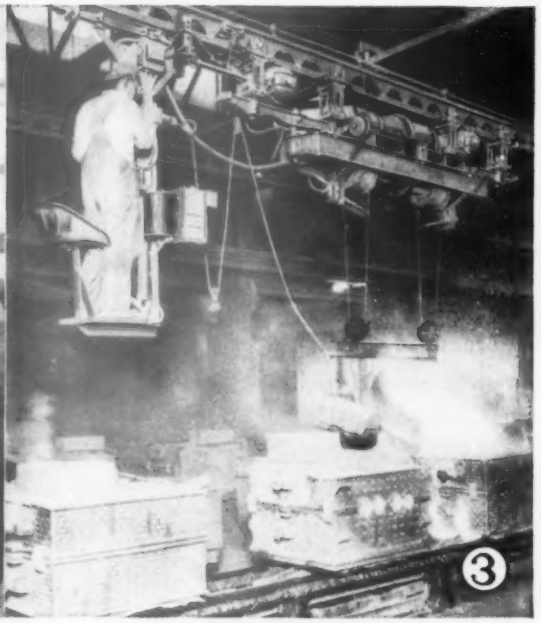
* * *

Chain Belt Co., Milwaukee, has opened a new warehouse and sales office at 1611 Dragon St., Dallas, Tex.

* * *

Portage Lake Foundry & Machine Co., Ripley, Mich., has been sold to Axel Koski of Keweenaw Bay, Mich.

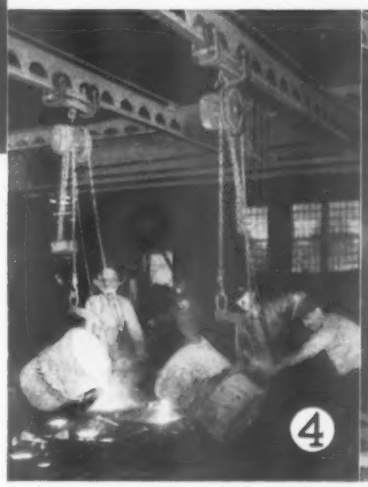




In FOUNDRIES *of every type*

POURING IS EASIER • FASTER • SAFER *with* CLEVELAND TRAMRAIL

Hundreds of foundries have speeded pouring and made the work easier and safer with Cleveland Tramrail overhead materials handling equipment. Why not check and see what it can do for you?



1 Small gray iron

2 Centrifugal pouring

3 Large scale continuous production

4 Large malleable

5 Brass and bronze

6 Large gray iron

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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

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CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

HERE CLEANLINESS PAYS EMPLOYEES A BONUS

In the $3 Million Home of Cleveland Graphite Bronze Co., shower baths earn 25¢ daily

* **Shower Bonus**—So complete shower facilities were provided in the foundry and other dirty-job departments. Special factory work clothing was provided for workmen in those departments. And that's not all: There's a special daily bonus of 25c for every man in such a job who takes a shower and changes his clothes at day's end.

"This bonus," says Myers, "is now routine. The $30,000 it costs us annually is money well spent. That bonus pays off in relations between employees and management; it also pays off in good health for the employees."

$30,000 Paid Annually to those who clean up in BRADLEY Multi-Stall Showers

Made in 3-stall and 5-stall shower units, they simplify installation in either old or new buildings. Piping is reduced because one set of water supply and drain serves each 3- or 5-stall unit.

And...for In-Between Washing...There are 20 BRADLEY Washfountains

Clean running water from the central sprayhead serves 8 to 10 simultaneously. Foot-control cuts water waste and maintenance. Let us mail Catalog 4701 to help you plan better washrooms.

BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wisconsin.

**Excerpt from Business Week*

DISTRIBUTED THROUGH PLUMBING WHOLESALERS

BRADLEY *washfountains* AND *multi-stall showers*

Write today for Catalog 4701

Controls Are Stressed by British Steel Foundry

(*Continued from page* 88)

bays, 60 ft span x 600 ft long, with annexes for core shops, pattern storage, and sand plant. Metal is supplied to the light foundry from a 2500-pound converter plant and a 2½-ton acid electric furnace. The heavy foundry has three basic electric furnaces, two of 10-ton and one of 3½-tons capacity. The light foundry is equipped with pneumatic jolt-squeeze straight draw molding machines and 750-lb jarr roll-over machines, and the heavy foundry has jarr roll-over molding machines from 750 to 10,000-lb capacity. Sand is supplied to the molding machines by overhead belt-type distribution conveyors in both foundries. A complete system of roller conveyors serves the molding machines in the light foundry.

Heat Treat the Castings

A number of furnaces are available for heat treatment of castings. These include a gas-fired removable-top type furnace, of 21 x 14 ft hearth area, three 20-ton bogie gas-fired annealing furnaces, and four 5-ton batch heat treatment electric furnaces. The gas furnaces are of the company's own design. There is also one large quenching bath, 15 x 12 x 14 ft deep, and one oil and one water bath, each 8 ft square by 13 ft deep. All furnaces are thermostatically controlled and fully instrumented.

The heavy foundry occupies the right-hand bay of the building. The middle bay contains two of the three melting furnaces, the drying ovens, and a machine jobbing section and core room. The third bay contains heavy molding machines, a jobbing section and the third melting furnace. The heavy casting section is served by 30-ton cranes, with 10-ton auxiliary hoists. A number of side travelling cranes serve the molding machines.

Sand is supplied the molding machines by conveyor belts. In the floor molding section, the backing sand is conveyed by grabs, and the facing sand is carried in tubs from storage pits linked up with the sand plant by a belt conveyor system. Castings up to 4 tons in weight are molded in green sand, and portable gas-fired vertical mold dryers are used extensively. Small molds are skin dried by hand torches.

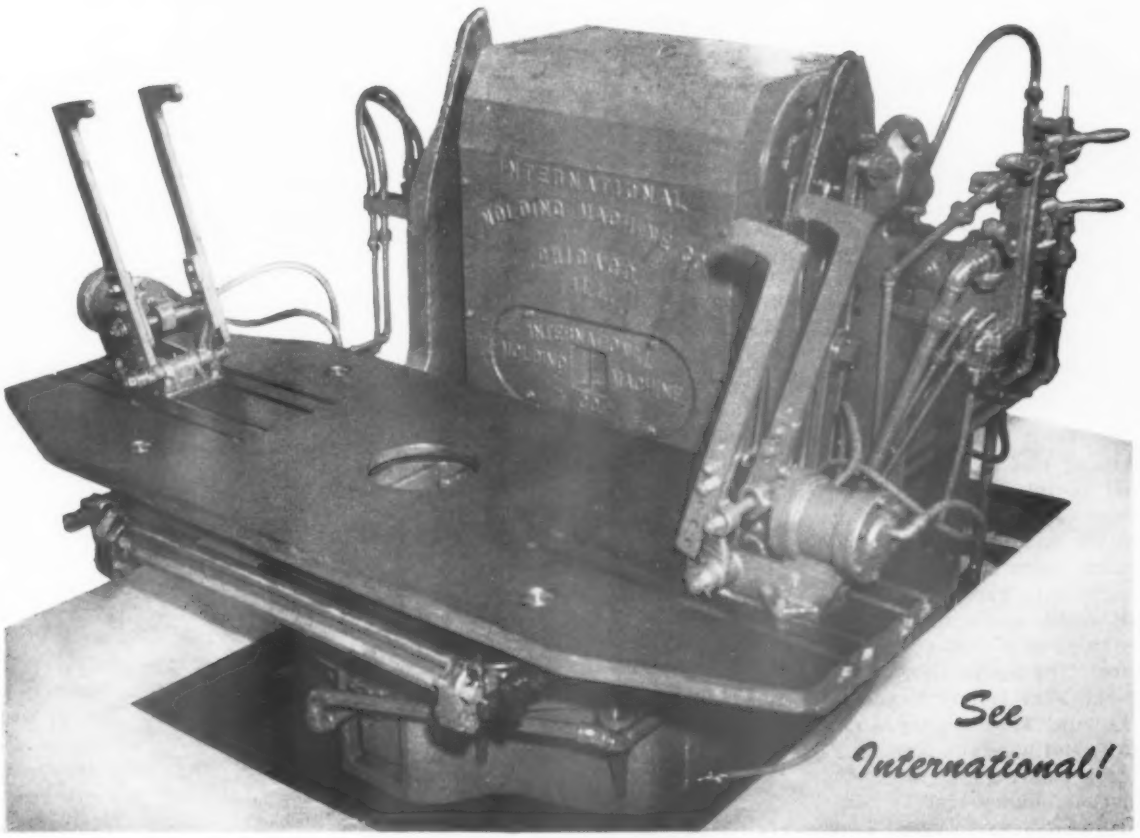
Mechanical vibratory knock-out grids are used, except on the heavier molds. Most cores are made by hand.

(*Continued on page* 170)

For LARGE Jolt - Rollover - Draw Work

INTERNATIONAL

TYPE F MACHINE



INTERNATIONALS are made in 90 Standard Types and 1400 Different Sizes. Special Designs to meet your special requirements may be developed for you. Foundries maintaining High Production are equipped with INTERNATIONALS. "There's a type for Every Job."

INTERNATIONAL FOUNDRY ENGINEERS, trained with practical experience of the working needs in the modern foundry, are ready to consult with you about your particular mechanical problems.

INTERNATIONAL MOLDING MACHINE CO.

LA GRANGE PARK, ILLINOIS • (Suburb of Chicago)

(*Continued from page* 168)
but jolt roll-over machines are used on the larger quantity items. Batch-type core ovens are used for larger cores, and vertical continuous core drying stoves for the smaller ones.

As stated before, metal for the heavy foundry is melted in two 10-ton electric furnaces and one 3½-ton electric furnace. For pouring the heaviest castings, a maximum of 30 tons of molten metal is available by combining all the furnaces of the light and heavy foundries. A special technique of applying rammed dolomite linings, for both bottom and side walls, is in use on all furnaces in the heavy foundry. This gives a long life and low relining cost, and also has the advantage of increasing the furnace capacity.

In view of the diversity of weight and shape of the castings made, a wide variety of cleaning equipment is required. For the lighter castings this includes different types of airless and shot blast rooms, tables and barrels are used.

For removing heads from circular or conical shapes, a special oxyacetylene cutting machine (Fig. 15) has been designed and patented by the company. In this machine, the acetylene cutter is held by an adjustable arm that can rotate in a horizontal plane, the arm having been adjusted to the correct height. On each side of the cutting equipment is a revolving plate on which is fixed the casting. This plate is carried on a base, on which it can rotate freely, but the base itself is driven by an electric motor and the angular speed of rotation can be adjusted to obtain any desired speed of travel of the cutting flame. While the operator sees to the cutting of the heads of one casting, another casting can be fixed on the plate of the alternate stand; thus, the cutting is automatic, and the necessity for subsequent grinding is eliminated.

For dressing heavy castings, a modified type of balanced swing frame grinder (Fig. 12) designed by the firm, is used. In these grinders, the wheel is at a right angle with the swinging arm, instead of being in line with it; thus, the operator has a clearer vision of his work, and there is better access for grinding a surface recessed into the casting. Heavy heads on alloy steel castings are cut by oxyacetylene cutters; the heads are cut about 4 inches from the base of the casting before heat treatment, to avoid cracks. All castings to be heat treated pass a preliminary test for correct composition before heat treatment. Cleaning of large castings is done in a hydroblast room; there are also two shotblast cabinets. Dust from all shotblast units is collected and disposed of as a sludge by dust arrestors.

Exercise Laboratory Control

Control of the product at its various stages of manufacture, and control of materials, are performed in the laboratories. Routine chemical tests are carried out on bath samples from the electric furnaces, with which direct contact is established by a system of pneumatic tubes. A Swedish carbometer is used for bath samples on the acid furnace, and this has saved 20 minutes on the furnace operating cycle.

Radiography is used for primary sampling of the castings. A radiograph of every quantity-produced casting is kept on record; larger castings are radiographed at particular sections. A complete metallurgical history is kept of every cast of steel and correlated with the physical test results. Mechanical testing is done on test pieces taken from each heat. Records of chemical analysis and physical tests of castings are kept in graphical form to show up any deviation from specification. A separate laboratory is devoted to sand testing, mainly by AFS methods; each batch of facing sand from the sand mills is tested.

Mention has been made of the works council, which is an integral part of the organization, and ensures the closest co-operation between employees and management; it also enables the employees to discuss with the management matters affecting their general welfare, and provides for the settlement of grievances. One

(*Concluded on page* 172)

Time and Motion Study Is Subject of Movie

By LYNE S. METCALFE

Time and motion study has occupied the attention of industrial management for many years, and had much to do with the rate of production during the war years. During the earlier stages, it was applied mainly to smaller operations such as subassembly work in the electrical field. In more recent years, it has been found useful in practically all industry and certainly in the metals field. That the foundryman can apply many of these basic time and motion study principles to every day operations with profit and satisfaction is clearly revealed in a new sound motion picture, "The Easier Way," produced by the Jam Handy Organization for General Motors Corp.'s employee staff, and which is now available for free showings to interested groups in the foundry trade.

While there has been much resistance to time and motion study principles not only among the rank and file of workers but also among the lower level supervisory people, it is the primary purpose of this film to prove to them that the application of time and motion studies actually benefits all concerned.

Principles developed in the film apply to any operation of any kind in any shop. From the point where the movie leaves off, the supervisory level will better understand how to go about analyzing the time and motion factors in each job or type of job and arrive at a procedure best suited to the particular achievement goal.

One sequence, for instance, shows the basic principles of properly laying out workmen's *materials*, especially with relationship to the use of the operative's hands. Here alone the factor of fatigue, it is shown, may be attacked and the well being of the operative improved—not to mention a natural step up in production rate.

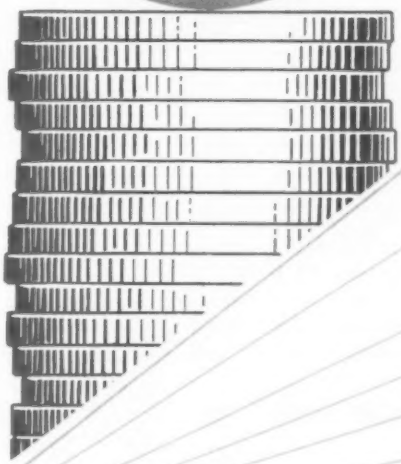
It has been found that the resultant discussion of the material pictured and orally explained via dialog, helps to drive home the truths expounded in what is, in fact, a lively little motion picture drama, produced in full professional quality.

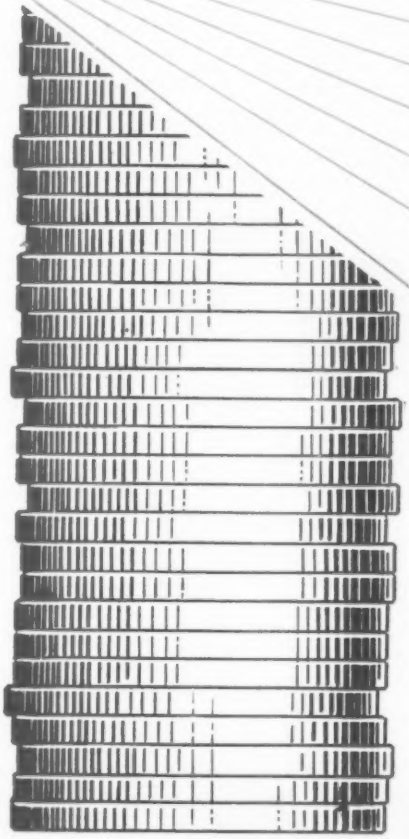
The picture has a double appeal—first, to the supervisor; second, to the individual operative who certainly

will benefit by any arrangement which reduces fatigue and makes work more pleasant and productive. That is why mixed audiences are recommended when showings of the movie are made in an individual plant or factory.

For the free use of this motion picture in 16 mm write for details to Department of Public Relations, General Motors Corp., 9-252 General Motors Bldg., Detroit 2.

Hercules TRULINE BINDER *Cuts Core Room Losses*





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"TRULINE" REPLACES CORE OIL

MAKES MORE UNIFORM CORES

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"TRULINE" ELIMINATES PITCH

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UP TO 50% LESS CLEANING TIME

FEWER CRACKED CASTINGS

CLEANER CASTINGS

ELIMINATES SCABS

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REG. U. S. PAT. OFF.

NF9-1

(*Concluded from page* 170)

important object of the council is to make arrangements for the joint investigation of matters relating to production and increased efficiency. By its constitution the works council is precluded from discussing matters covered by operative agreements with trades unions or which are normally dealt with by the approved machinery of negotiation and discussion through the employee's representatives. All matters affecting wages and conditions of employment are specifically excluded.

The managing director is ex-officio chairman of the council. The management is represented by six members, appointed annually by the managing director. Directors of the firm are ex-officio members of the council, but without voting powers.

Employees are represented by a maximum of 25 members elected by secret ballot, on the basis of not more than one for every 75 employees and covering, as far as possible, the various shops, clerical staff, foremen and supervisors. All employees over 21 years of age, male or female, who have had not less than one year's continuous service with the company are eligible for election as members of the council. All employees over 18 are eligible to vote, and elections take place annually in March. Members of the council are elected for two years and are eligible for re-election; half the employee membership of the council is renewed each year. The council appoints a vice chairman annually, and two joint secretaries are appointed, one by the managing director, the other by the employees' representatives.

There is a work council advisory committee, comprising five members from each side. Both the full Council and the advisory Committee meet alternately every four weeks at two-week intervals. The advisory committee receives reports and presents them to the council; it also prepares the agenda of council meetings. The organization is completed by ten departmental committees, with the foremen as chairmen and the shop stewards and the welfare officer as permanent members. These committees discuss matters which are purely domestic in regard to the respective departments.

The training of apprentices is another feature of the administration, and is still in the process of development. Sections of both the foundry and the engineering department are set aside and equipped for special training purposes. The training is divided into two main sections, basic training and applied training. Basic training consists of working under the direct instruction of a teacher, skilled in the work in question. Applied training consists of practical experience on productive work, supplemented by lectures. The apprentice sections form a part of the production unit in the foundry and engineering departments respectively, and the apprentices are trained entirely on productive work.

A new employee, coming into the factory, spends a day on what is called the "induction course," in which the products and history of the firm are explained to him. He is also given detailed information regarding works rules, safety-first, and the organization of the company insofar as it affects him. Information is also given regarding canteen, welfare, and sport facilities. The progress of new employees is carefully watched for the first few months they are at work, and suitable candidates are selected for training for semi-skilled and skilled occupations.

Recently, an adult student course was run for those men between 25 and 30 years of age who showed exceptional promise at their various jobs. The object was to give them wider experience in the work of the company, so that they could qualify for more responsible positions. The candidates were selected in the first instance by their own departmental heads, and the final selection was made by the managing director, who interviewed each candidate personally. The whole course lasted 14 months, and in that time the students successfully completed a course of direct instruction and practical experience of production and administrative work in every department.

OLD TIMER: Seventy-three year old Otto Bjork still works every day as a molder at Sterling Foundry Co., Sterling, Ill. Even before he left Sweden for the United States at the age of 19, Mr. Bjork had watched molders doing the type of work he has been engaged in for 45 years. He found molding intriguing then and says it increased in interest for him as he gained experience. Mr Bjork's work nowadays is exclusively loose pattern molding, and in view of his years, his work is amazing. Any foundryman knows the vast amount of manual labor represented in putting up a floor full of molds every day. The carefulness and steadiness of hand and eye required in loose pattern molding make the accomplishment of septuagenarian Otto Bjork even more impressive

Production Story

In a booklet, "Process-Iron Castings that Solve Your Production Problems," McNally Pittsburg Foundries Inc., Pittsburg, Kans., outlines its methods of producing alloy iron castings. Company operation, control, its production facilities for all sizes of castings and characteristics of its alloy irons are described.

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IN Modern Equipment Company's "Lifetime" geared ladles, easy, accurate pouring is assured by Timken® tapered roller bearings on worm shaft and wheel shaft. Timken bearings at these positions reduce friction to a minimum—keep gears and shafts in alignment so they work better, wear longer—prevent end-play and back-lash from developing. And since Timken bearings permit the use of effective closures, foundry dust is kept out—lubricant kept in.

Timken bearings are tapered in construction—carry any combination of radial and thrust loads. Due to the line contact between rolls and races, Timken bearings have tremendous load-carrying capacity. Their true rolling motion and incredibly smooth surface finish enable them to operate freely, frictionlessly. They're made of the best steel ever developed for tapered roller bearings—Timken fine alloy steel—and normally last the life of the machine.

Over the years, the dependable performance of Timken bearings have made Timken-equipped products first choice throughout industry. When you specify tapered roller bearings for the equipment you build or buy, look for the trademark "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

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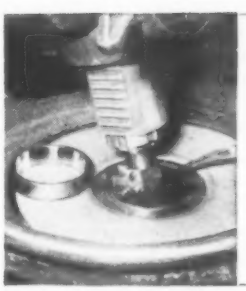
uses Timken bearings on worm shaft and wheel shaft of its geared ladles to insure easy, accurate pouring.



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Machine Molding

(*Continued from page* 90)

depth of several inches. Then ram the sand in the pockets with an air or hand rammer until it is firmly compacted. The remainder of the mold is finished with the slinger.

One common source of this difficulty are places where cope bars come too close to the pattern, or to a sink head, making a narrow opening that cannot be rammed properly. As readily may be imagined, it is possible to ram a drag through a grid only when the openings in the latter are quite large, and the bars not too thick. In flasks suitable for big castings, this often can be taken care of, but for smaller flasks the grid may have to be made up as a separate part and bolted to the drag after the latter has been filled with sand.

Arbors usually required to strengthen large cores and draw-backs also interfere with operation of a slinger. The bars of these arbors break the velocity of the stream of sand so that it is difficult with the slinger alone to ram the bottom of the core to proper hardness. Best practice in such cases is to use the slinger until the box is filled to the level of the bars of the arbor, stop slinging and ram the sand with air or hand rammers, then finish with the slinger.

If a number of stiffening rods must be used in a core, slinging must be interrupted at intervals to allow the operator to set the rods and seat them firmly, so that the stream of sand will not move them out of place. On the other hand, as already mentioned, cores that require arbors cannot be made on jolters. The choice for such work, therefore, is not between slingers and jolters, but between slingers and hand ramming. When there is enough work in sight to keep a machine busy on cores of this type, a considerable saving in operating costs can be attained with the slinger.

In ramming copes with a slinger, it is hard to keep the gaggers from being moved out of position or tipped over completely by the stream of sand. When operating a slinger, it saves time and trouble to use gaggers that are bent over the cope bars, or straddle over them, with half the gagger on each side. Whenever possible, the gaggers should be welded to the cope bars.

Impact of the sand stream from the slinger will compact only a thin layer of loose sand spread over the pattern before the machine is started. The stream of sand from a slinger does not possess enough inertia to compact thoroughly any but a rather thin layer of sand, and will not ram the sand piled upon parts of the pattern that are vertical or lie at a high angle. When the facing is to be applied separately, it is better to pack it against the pattern with hand or air rammers. To allow the facing sand to knit with the backing sand it is roughened with the point of the trowel. The backing is then fed in with the slinger.

Use One Kind of Sand

For the most satisfactory operation, either the same kind of sand must be used for the whole mold, or arrangements made to feed facing and backing successively. On large machines, this may be accomplished by having two hoppers feeding the main delivery belt. The same result may be secured with smaller machines by mounting two hoppers on them, filled by grab buckets carried by the crane. In making comparatively shallow castings it is not difficult to cover the pattern first with facing fed by the slinger, and then fill up the flask with backing sand. However, deep work is what the slinger is particularly recommended for, because it rams the sand uniformly throughout the mold. In most cases many surfaces on deep patterns will lie at a high angle. To cover the pattern with facing sand from a slinger, it is necessary to shift back and forth from facing to backing a number of times while the flask is being filled, thus delaying operations. Whenever possible, the better practice is to use only one kind of sand for the whole mold.

The stream of sand thrown by a sandslinger has some of the characteristics of a sand blast, and is correspondingly hard on patterns. For this reason, patterns to be used in repetition work with these machines should be protected against wear to a much greater extent than when they are to be rammed by hand, or even jolted. For slinger operation, it frequently is necessary to sheathe the pattern and board completely with sheet metal, rubber or composition, and to use metal castings for parts that cannot be so protected.

(*Continued on page* 176)

"Large Oaks From Little Acorns Grow"

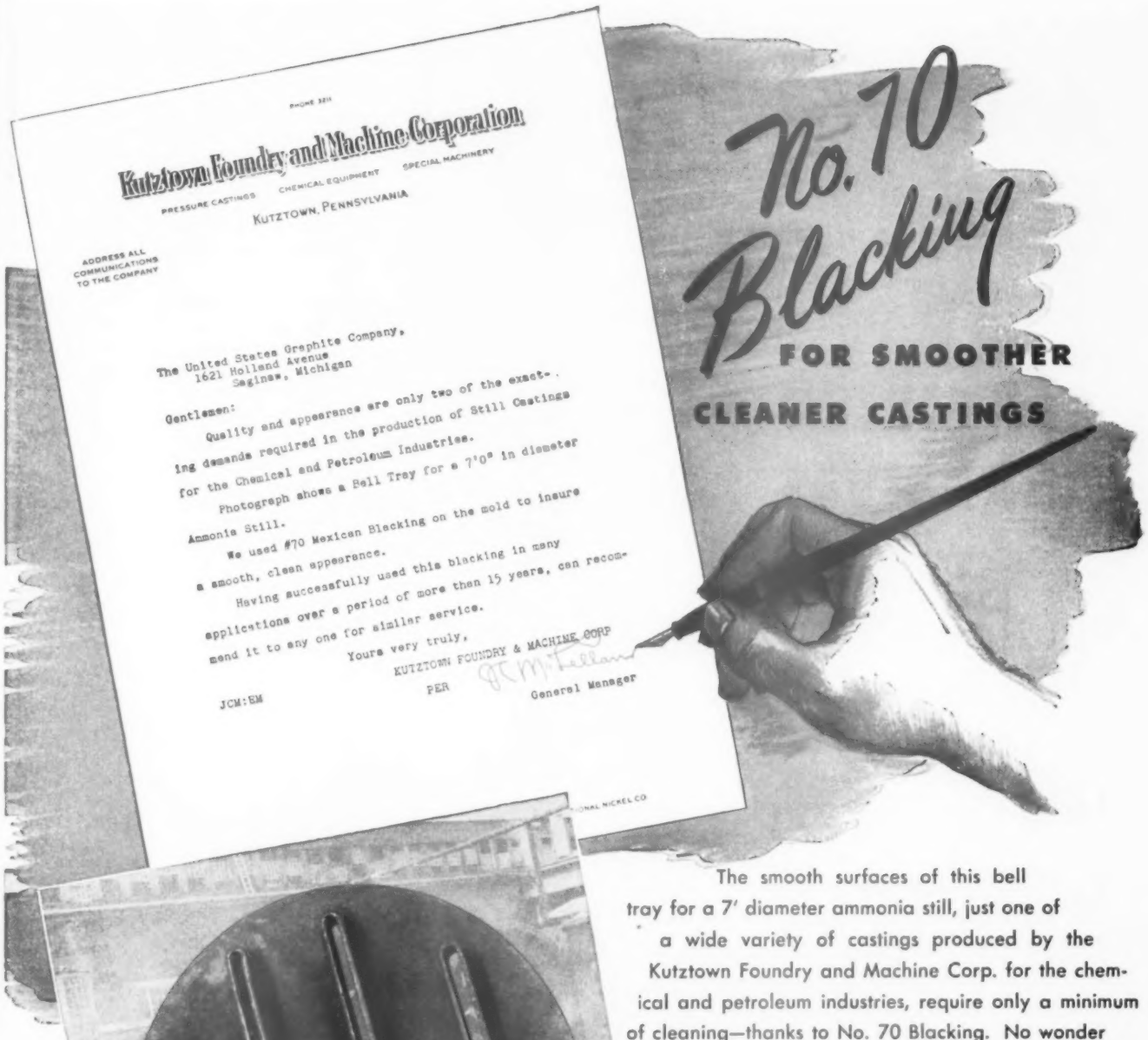
By WILLIAM K. MITCHELL

AMERICA's large nonferrous foundry industry, which today produces countless thousands of automotive castings yearly, can trace part of its growth to the little town of Kokomo, Ind., and to Elwood Haynes, the genius from Kokomo who conceived and helped produce the first aluminum castings to be used in an automobile. These parts were among the first—if not the first—commercial aluminum castings poured in the United States.

Haynes, who in 1894 built and drove the first mechanically successful automobile in the United States, completed his second, improved model in 1895. In an effort to reduce engine weight he conferred with the late J. W. Johnson, operator of the old Kokomo Brass Works, and George Kingston, an associate of Johnson. Out of this conference came the first aluminum automotive castings—a crankcase, flywheel and other parts. The *Chicago Times-Herald* immediately proclaimed this advance in automotive design and presented a $150 prize to Haynes for the "best balanced engine in horseless carriages."

So successful was this venture that the use of aluminum in the Haynes auto was expanded to include the carburetor and, in the touring model, several body panels. Johnson and Kingston, meanwhile, sensing the importance of aluminum to the infant auto industry, formed the Kingston Products Co., in Kokomo, and began the manufacture of carburetors for the Model "T" Ford and aluminum crankcases for the Haynes, Apperson Jackrabbit, Stutz and Marmon cars.

Haynes' 1895 model was famous for another first—the first pneumatic tires ever used on an automobile. These were built for Haynes by David Spraker, inventor of the pneumatic bicycle tire, and a resident of Kokomo. Haynes, himself, furthered his fame in the field of metallurgy by his development work in Stellite high-speed cutting tools and stainless steel. Variations of his formulas and a wide variety of other special alloys currently are produced by the Haynes Stellite Co., Kokomo, a division of the Union Carbide & Carbon Corp., New York.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We used #70 Mexican Blacking on the mold to insure
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The smooth surfaces of this bell tray for a 7′ diameter ammonia still, just one of a wide variety of castings produced by the Kutztown Foundry and Machine Corp. for the chemical and petroleum industries, require only a minimum of cleaning—thanks to No. 70 Blacking. No wonder Kutztown writes, recommending the use of No. 70 Blacking. This versatile mold coating penetrates deeply into sand surfaces to form a hard coat which turns out smoother, cleaner castings. It is economical and easy to use. No. 70 can be sifted dry through a cloth bag in treating green sand molds, for it draws sufficient moisture to bond to the sand; or it can be mixed with water to make an excellent wet blacking which assures a hard coat with maximum sand penetration for light and medium weight dry sand, skin dried and loam molds. It is also used by many production foundries to dip small baked cores which need extra protection under intense metal conditions.

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(*Continued from page* 174)

To make patterns in this way adds to their cost. On the other hand, the pattern boards are not subjected, as they often are on jolters, to the impact of heavy flasks, and therefore need not be reinforced against destruction from this source. There is almost no tendency to force the gaggers to the bottom of the flask in ramming copes. Boards and patterns are not damaged in this manner.

When the pattern is so shaped that it can be covered with facing before the slinger is started, it is protected from the cutting action of the sand. In some cases, the whole pattern can be covered. In others, it is possible to thus protect part of the pattern, and to armor projecting portions that cannot be taken care of in this way, with ram-up cores, comparatively thin dry sand cores whose only function is to protect the pattern. They are shaped on the face as the corresponding part of the mold would be, if they were not used. They should be made of a sand mixture with a high dry strength, to resist the sand stream. They are adjusted to the pattern and quickly covered after the sand has been rammed to their level.

Slingers Give Satisfaction

All things considered, slingers when properly operated do a very good job in compacting the sand evenly from top to bottom of a mold or corebox, and are particularly satisfactory for ramming very large molds. Large cores, in which arbors are required, readily are made with slingers. In repetition work, where one flask or corebox is to be used for a large number of molds or cores, it is possible with slingers, as with hand ramming, to attach a great many of the gaggers to the cope bars or core arbors. They do not have to be re-set each time the corebox or cope is rammed.

It requires some vigilance and planning to keep these semipermanent gaggers from being bent completely out of shape in shaking out the castings, and at least a little time has to be spent in straightening and renewing them. In a well-run shop it costs far less to do this work than to place a set of loose gaggers in a large cope or corebox. For ramming molds, this item alone may give the slinger a considerable advantage. In making large cores with heavy arbors, where the choice lies between hand ramming and slinging, slingers hardly can fail to show the lower cost.

For very large flasks, the slinger has a pronounced advantage. It can be set on a comparatively light

(*Continued on page* 179)

Quantity
PRODUCTION
of
GREY IRON CASTINGS

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ONE OF THE NATION'S
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ESTABLISHED 1866

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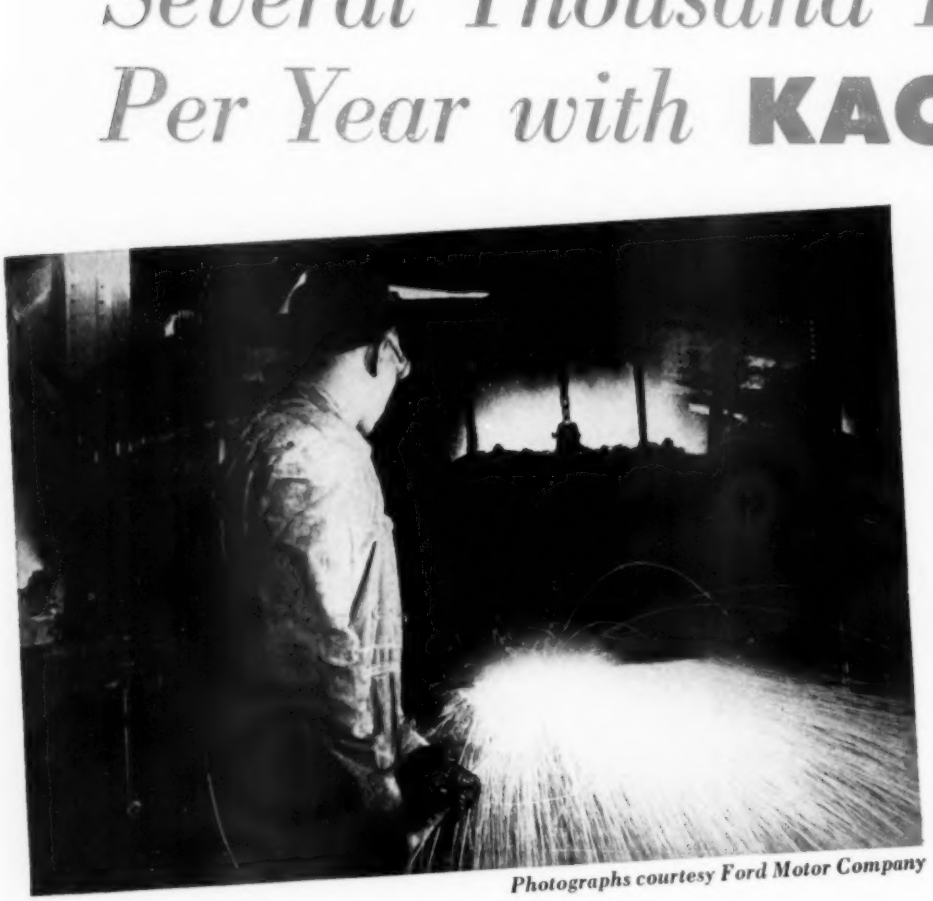
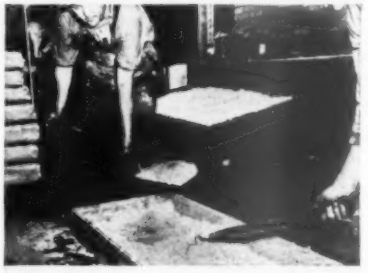


Photographs courtesy Ford Motor Company

KAOCAST, easy to use as ordinary concrete, can be mixed in mortar box or concrete mixer.

Shell of furnace door, cleaned, ready for installation of KAOCAST.



Shoveling KAOCAST into place. KAOCAST can also be poured like ordinary concrete, plastered in place, or applied with a cement gun.

A large automobile manufacturing firm found that high temperatures and severe operating conditions were playing havoc with the doors of their 15-ton electric furnaces. Run 16 hours a day, 5 days a week, these furnaces are poured every 2½ hours and are charged twice during each cycle. With a good grade of firebrick, furnace door linings lasted an average of only two or three days before replacements were necessary.

A trial installation of KAOCAST—the B&W high temperature Refractory Castable—was made. The KAOCAST doors stood up two to three weeks . . . *five to eight times longer than firebrick.* As a result, doors on all electric furnaces of this type are now lined with KAOCAST. *Savings in maintenance are running into thousands of dollars per year.*

Your B&W Refractories Engineer will be glad to show how KAOCAST will cut your furnace operating cost. Write or call him today.

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B&W 80 FIREBRICK • B&W JUNIOR FIREBRICK
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(*Continued from page* 176)

foundation and does not jar its surroundings.

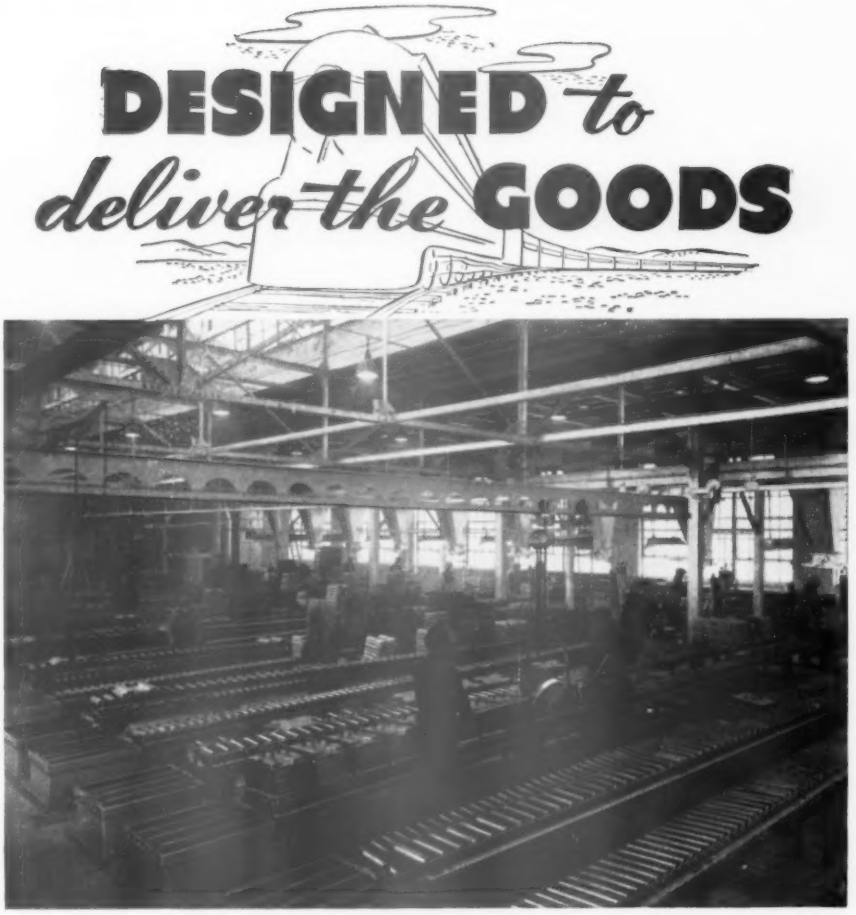
In ramming drags on a jolter, it is sometimes difficult to place the tile bricks used for sprues and runners that carry the steel to the bottom of the mold. The tiles that make up the vertical sprue are supported on the pattern board during jolting, and are easily taken care of, as the sand packs down evenly around them and holds them firmly in position. The horizontal part of the runner and gate which connects the bottom of the sprue to the mold cavity presents a different problem. If these tiles were set at any stage of the ramming they would move down with the sand and so get out of place. In some cases it is possible to dig into the drag after jolting is complete, set in the necessary connecting tiles, and ram the sand around and over them by hand. When this method cannot be adopted, it may be necessary to form the gate in one or more cores, set into spaces made in the mold by core prints on the pattern, and use tiles only for forming the vertical sprue in the cope and drag.

Set Tiles for Gates

When using a slinger, tiles for the entire gate system readily are placed in the same way as when the mold is rammed by hand. Those that form the sprue are set with the pattern. Sand is fed in around them, up to the level of the horizontal part of the gate. Tiles connecting the bottom of the sprue with the mold cavity are then set on the rammed sand. The mold is finished with the machine, leaving the tile buried in the sand in the proper position.

Patterns may be drawn from molds made with the slinger either by hand, or with suitable hoists. Coreboxes of course can be handled similarly. To secure maximum economy from the equipment, flasks or coreboxes rammed with slingers usually are moved by the crane, or by roller conveyors to separate pattern drawing devices. When the machines are set up in pairs for high production work, the copes usually are raised from the pattern. The depth of the draw and the necessity of doing much patching, finishing, core setting, etc., determines the type of machine to adopt. When cement bonded sand is used, it is not always possible to lift the sand off a pattern. The reverse motion must be adopted.

Use of coreblowing machines for the most part is restricted to repetition work, since it seldom pays to provide the type of coreboxes required for a blower, unless very large num-



Photo—Courtesy Republic Brass Co.

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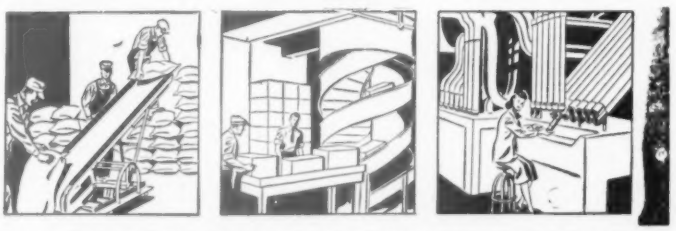

ROLLER-BELT-SLAT-PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

bers of cores are required. The machine, Fig. 26, consists essentially of a sand reservoir and blow-plate arranged to move back and forth from the filling position under a tank or reservoir filled with sand, to the blowing position. The sand is ejected from the reservoir by compressed air, into a corebox in close contact with the blow-plate.

The coreboxes usually are metal, with tightly fitting machined joints, and with special air vents placed at suitable places. Air in the box is released quickly through these vents while the sand is prevented from escaping. The sand enters the box through holes which match and make a tight fit with holes in the blow-plate. Location of these openings and that of the air vents must be such that the sand fills the box with the least interruption of its motion, to prevent soft rammed spots in the cores. As in so many other foundry operations, the final arrangement of blow holes and air vents in boxes of complicated shape often is the result of a process of trial and error.

Blow Plate for Several Boxes

Openings in any two boxes seldom are located at the same positions. As the holes in the blow-plates must match those in the boxes, a separate blow-plate may be required for each box. To make the machine adaptable to a wider range of product, and to reduce the cost of necessary equipment, core blower makers have developed designs that make a single blow-plate serve a number of boxes. This is done by shaping and locating the holes in the blow-plate in a manner to feed sand to several different arrangements of holes in the boxes. All or parts of the holes are blanked off when the box is put in position. By such means the use of core blowers is extended to cover cases where the number of cores from each box formerly would not have justified the installation of one of these machines. Even some small molds now are being economically produced with core blowing machines.

When the core prints extend to the surface of the box, stiffening wires or small rods can be pushed into the finished cores before they are removed from the box. During blowing, the clamps that hold the box in position cover these openings. In some cases, rods can be set by filling part of the box by hand and supporting the rods in this sand, or by special pieces or seats in the box which support the rods. If too many rods are placed in a box they are apt to interfere with the flow of sand. For the most part, core blowers are used for mass production of small and medium sized cores that require little if any mechanical stiffening.

Vents in blown cores can be formed by rods fitting closely in holes drilled through the sides of the box, as shown in Fig. 25. The rods are pushed into position before the core is blown, and withdrawn before the box is opened. The close fit around the rods is required to prevent the escape of sand through the holes, which rapidly would wear away the box and enlarge the openings.

Blown cores of simple shape may be turned out on flat drying plates, but in most cases they are of more complicated outline and must either be bedded-in with sand, or supported on metal drying forms or shells. As blowers are used chiefly for mass production of cores, the latter method usually is adopted. Bedding-in at best is a time-consuming operation that has no place in such a setup.

Sand mixtures bonded to a high green strength will not function well in core blowers, as such sand "craters" readily in the reservoir. The air merely blows a hole through it, instead of ejecting a proper amount of sand into the box. As a rule, core sand mixtures used in blowers are made up with a minimum of cereal and other binders that give high green strength. The object is to use a mixture that will hold together well enough to be handled on core dryers, and possess the necessary dry strength after baking. In at least one shop making small fittings, cement-bonded sand has been used successfully in blowers to make many of the required cores.

For shops making fittings and valves for high pressure or high temperature service, where very large numbers of small and medium size cores are produced every day, core blowers can be used to great advantage. They are also well adapted to the production of the smaller cores used in shops making certain railroad specialties. In jobbing foundries and shops making a general line of small and medium size or heavy steel castings, a core blower may not always prove an economical unit.

TABLE I—PHYSICAL PROPERTIES OF SAND MIXTURES

(Three Minutes Total Mixing Time)

Test No.	Addition Order to Sand			Green Comp. (psi)	Green Comp. (psi), Air Dry 4.5 hr	Tensile Strength (psi), 105 min @ 425° F
	First	Second	Third			
1690	water	oil	cereal	.3	4.9	194
1691	water	cereal	oil	.4	12.4	265
1692	oil	water	cereal	.4	5.1	189
1693	oil	cereal	water	.3	*	167
1694	cereal	water	oil	.5	23.8	276
1695	cereal	oil	water	.3	1.2	180
1696	All together			.5	24.2	265

* Too weak to handle.

Gray Iron Group To Have Exhibit

Gray Iron Founders' Society will exhibit at the National Metal Exposition to be held in Cleveland, Oct. 17 to 21. The project is part of the society's long-range program designed to acquaint engineers and metallurgists with the useful properties of gray iron. Charles O. Burgess, technical director of the society, will be in charge of the booth to explain latest developments in the gray iron field.

Book Review

Transactions of American Society for Metals 1949, cloth, 1460 pages, 6 x 9 inches, published by the American Society for Metals, Cleveland.

Containing a report of the 1948 annual meeting of the American Society for Metals as well as the Campbell Memorial lecture on "Retained Austenite" by Morris Cohen, this volume also includes the 49 papers and discussions presented at the technical sessions which were held. Papers presented cover a wide field dealing with steel, cast iron, aluminum, powdered metal, copper-base alloys, etc., and relate to such phases as mechanical properties, heat treatment, forming, microstructure, machining, effect of elevated temperatures, etc.

Sand Test Results Omitted

In the article, "Which Comes First —Core Oil or Water?", presented on p. 75 of the September issue, the results of one test—No. 1694—were omitted through error from a table listing physical properties of the various sand mixtures. In this particular test the cereal was added to the sand first, followed by the water and finally the oil. This sequence was indicated as the best of those studied.

For comparative purposes the complete table is reproduced at the left.

2 Good Ways to Reduce Non-ferrous Cleaning Room Costs!

Use **NORFLEX WHEELS** for Removing Gates and Risers

(1) Sturdy, yet flexible NORFLEX Wheels are reducing non-ferrous cut-off costs everywhere because they're strong and safe and will withstand considerable sidegrinding, twisting and bending.

(2) Although great strength and flexibility are outstanding features of NORFLEX Wheels, they cut fast, often faster than conventional cut-off wheels.

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CRYSTOLON Wheels, especially designed for grinding non-ferrous castings, feature a fast, smooth cutting action insured by strong, sharp CRYSTOLON abrasive and filler treatments which prevent wheel loading.

Their extra long life is insured by special B-5 and B-7 resinoid bonds for high speed wheels and by vitrified bond for slow speed wheels. They are available in a variety of sizes and shapes to fit all standard bench, floor stand and portable grinders.

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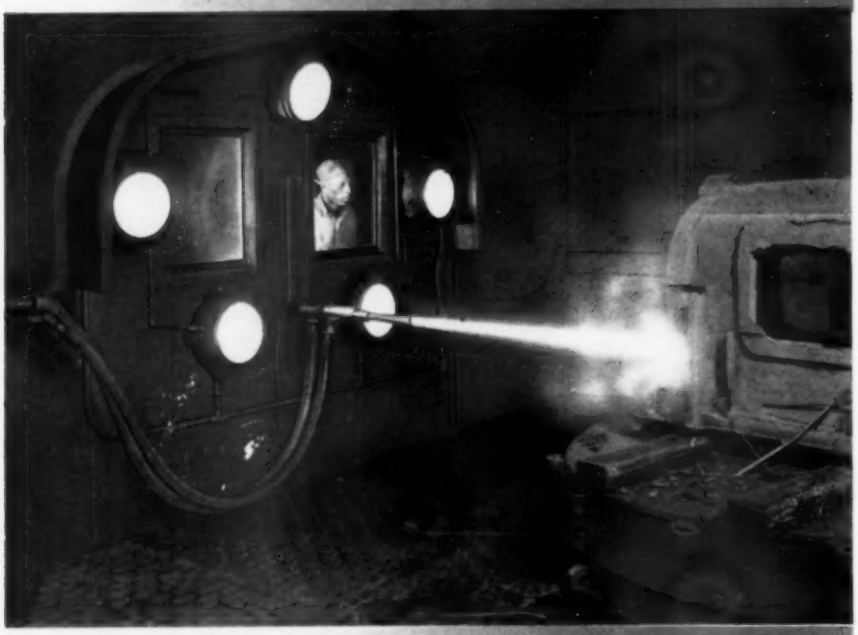

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With this Pangborn Hydro-Sand Blast and Core Knockout, you recover core sand and reclaim core rods without sledge damage. Your subsequent roughing, chipping and finishing operations become faster, cheaper jobs because of the efficiency and thoroughness of this machine.

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Look to Pangborn for all the latest developments in Blast Cleaning and Dust Control Equipment.

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

MAGNESIUM *in* CAST IRON

(*Concluded from page* 81)

Log I Mg/Fe vs Log Mg concentration, using three different line pairs.

The 2802.7A Mg becomes too dense at a concentration of 0.04 per cent. The 2780A becomes visible at about 0.02 per cent Mg and is usable to about 0.12 per cent Mg.

Flat Surface Technique—It became necessary to verify analysis on some actual castings and samples of various shapes and sizes. It was found that briquetted drillings were not reliable in their reproducibility and they were abandoned in favor of flat surface samples.

Several samples which had been spectrographically analyzed previously in pin form were used as standards. It was decided to use the spark technique since it was desirable to make analysis for elements other than magnesium which could not be obtained with one exposure using arc excitation.

Samples were ½ to 1-in. diameter sand cast bars, chill cast spectrograph pin bases and keel block ends. They were all ground flat on the side of a grinding wheel of the aluminum oxide type.

The sample was used as upper electrode and a hemispherically tipped graphite ¼-in. diameter used as lower electrode. Settings on the A.R.L. spark unit used were 4/3 kva; L8. Samples were pre-sparked ten seconds and photographed through a rotating sector set for 35 per cent transmission. Exposure by means of photo electric exposure control was about three seconds.

Fig. 1 shows a plot of Log I Mg/Fe vs Log Mg concentration. Line pair used is Mg 2802.69 vs FE2813.288A. This figure also shows that there is no significant difference between white and gray cast samples.

Reproducibility is good as shown by Table I. There have been too few wet chemical analyses to show any comparison with the spectrographic method, but it is believed to be within the 5 per cent of the amount of the present limit.

References

1. Donoho, C. K., "Producing Nodular Graphite with Magnesium," *American Foundryman* (February, 1949).

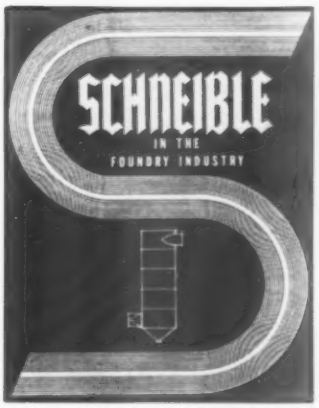
2. Churchill, J. R., "Technique of Quantitative Spectrographic Analyis," *Industrial and Engineering Chemistry*, annual edition, 16, 653 (1944).

Lincoln Foundry Co., Merrill, Wis., suffered fire damage estimated at $70,000 Sept. 8.

A WEALTH OF FOUNDRY DUST CONTROL AND VENTILATION EXPERIENCE

for the Asking . . .

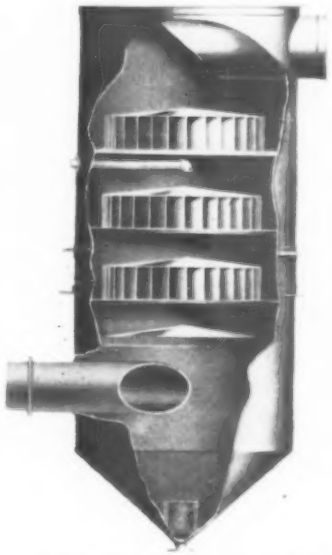
This bulletin covers latest Schneible advancements in foundry Exhaust Hood construction. Ask for bulletin No. 548



A general bulletin containing detailed information on all Schneible Foundry Ventilation and Dust Control Equipment. Ask for bulletin No. 47

Schneible Multi-wash Collectors, Dewatering Tanks and Pumps are detailed in this bulletin. Ask for bulletin No. 410

Specific information on Schneible Water Curtain type Cupola Collectors for melting department operation. Ask for bulletin No. 449



MULTI-Wash COLLECTORS
Model HC—1500 to 30,000 c.f.m. or multiple units for larger capacities.
Model JC—1000 to 30,000 c.f.m. or in multiple units, if greater capacity desired

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Type CS, pictured here, is priced $290. complete. It is one of several available types, and represents a real, labor-saving investment. This unit will process a volume of sand equal to the amount 20 men can riddle by hand. Other sizes designed in 10 to 30 manpower capacities.

Grinding Problems

(*Continued from page* 95)

one pattern, and attempt to obtain a uniform hourly production. Methods of application of the casting by operators differ greatly, resulting in cost differences varying to a greater degree than differences in abrasive wheel specifications.

The fourth suggested method is by operator earnings. Piece work rates are not necessarily based on the amount of material removed. They embody the entire operation, floor to floor time. The actual contact time, which is directly associated with abrasive wear, varies considerably with the type of casting. An intricate casting might require six different positions during the grinding operation, yet the actual grinding or contact time might represent a very small percentage of the total time. On the other hand, the grinding of a comparatively large gate might constitute a large percentage of the overall time and might easily be proportionate to earnings. Such a method would find some degree of favor if the test were confined to a single, large production pattern.

Many Factors Determine Costs

In summation, the determination of abrasive cost per pound of material removed represents the method most closely associated with the prime function of an abrasive wheel. Fairly accurate cost determinations, however, might result from other, closely supervised methods.

The second question in this group is "What is the advantage of the larger diameter wheel of 30 in. over 24 in. even though compensated by higher speed?"

The chief advantage of the larger wheel is the comparative lower abrasive cost per usable cubic inch of abrasive. For convenience, let us compare two resinoid bonded abrasive wheels, a 30 x 2 x 12 in. and a 24 x 2 x 12 in. In each case we will assume the discarding diameter to be 16 in.

The 24-in. wheel has a totol volume of usable abrasive of 502.656 cu in. The list price of such a wheel being $67.90 results in a list cost per usable cubic inch of abrasive of $0.1350. The 30-in. wheel (list price $111.90) has 1011.596 cu in. of usable abrasive. The list cost per cubic inch of usable volume is $0.1104, a saving of $0.0246 list per cubic inch.

Comparing the two wheels on a quantity basis, one hundred 24-in. wheels would have a total usable volume of 50265.6 cu in. and would

(*Continued on page* 186)

Here's What a TULSA FOUNDRY says about CITIES SERVICE 30 Series Core Oil

Placing core for condenser manifold for oil refining equipment: Nelson Electric Manufacturing Company.

"We are very well pleased with the results your 36 core oil has shown, and we are now using it all together.

We are producing grey iron, semi-steel and alloyed iron, ranging in size and weight from 1¼ oz. to 2500 lbs. With the 36 core oil, the ratios vary but we use the same sand now for all sizes of cores with a resulting uniform strength. Large castings can be poured with unsupported runner boxes without breaking. Since changing over to this oil we have saved considerable expense of using different sands, are using one-fifth less oil, and the baking time in the ovens has been reduced approximately two hours at a temperature of about 450 degrees F.

With the 36 core oil, only water and cereal binder are used with the sand and no other preparations are added. This oil is practically odorless and works good in either freezing or hot weather.

We certainly recommend your core oil, and the service you have given us has been excellent.

J. A. Dean, Manager Foundry Division
Nelson Electric Manufacturing Co."

Features of Cities Services 30 Series Core Oil that are building preference throughout the industry:

BETTER PERFORMANCE in core boxes, whether blown or hand rammed, whether sand is washed and dried or crude.

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If these properties of 30 Series Core Oil look good to you, contact your local Cities Service representative for information and immediate service assistance. Cities Service Oil Company, Chicago, Cleveland, Kansas City, St. Paul and Toronto, Arkansas Fuel Oil Company, Shreveport.

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IRON-FREE FOUNDRY SAND

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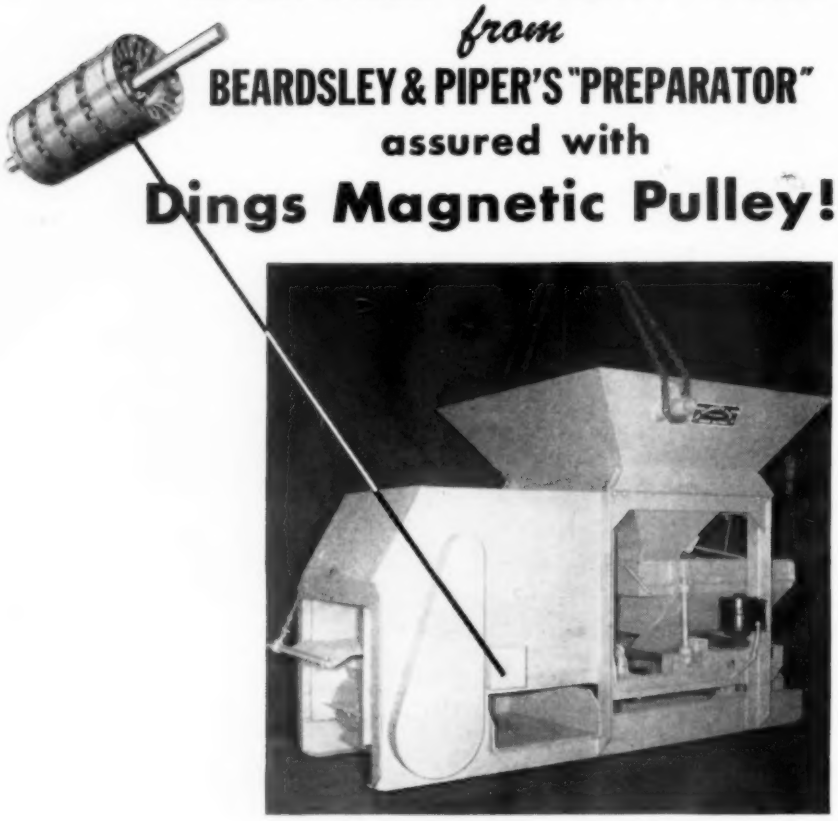
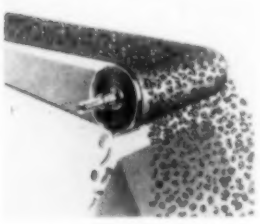


TAKE a tip from Beardsley & Piper engineers . . . to get *all* the tramp iron from foundry sand they specified Dings "High Intensity" Magnetic Pulleys as standard equipment on their new sand conditioner. Whatever *your* iron separation problem . . . from removing gaggers, sprues, risers, wires and iron scrap from foundry sand . . . separating ferrous from non-ferrous metals . . . to designing new equipment . . . Dings powerful magnetic pulleys are the answer. You get fully automatic removal and discharge of tramp iron without manual attention and maximum separation capacity at all times.



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Dings

"HIGH INTENSITY"

DINGS MAGNETIC SEPARATOR CO., 4708 Electric Ave., Milwaukee 14, Wis.

(*Continued from page* 184)

cost $6790. Identically the same total usable volume for the 30-in. size would require 49.68 wheels which would cost $5559.19 list. The difference in cost in favor of the 30-in. wheels would be $1230.80 list. Certain mechanical advantages also accrue to the use of a large-diameter wheel.

When contemplating the purchase of new equipment or the remodeling of present machines, it is important that considerable thought be directed to the wheel sizes that can be most economically used to the smallest possible discard.

The third question of this group is "Can one show a better cost on slow-speed wheels over high-speed resinoid in soft iron grinding?"

We interpret this question to mean total cost, labor, overhead and abrasive, rather than abrasive cost alone. High-speed operation, if the castings to be ground are actually adapted to this type of grinding, means increased production. Abrasive cost comparisons would not take into consideration any difference in rate of production resulting from the two methods.

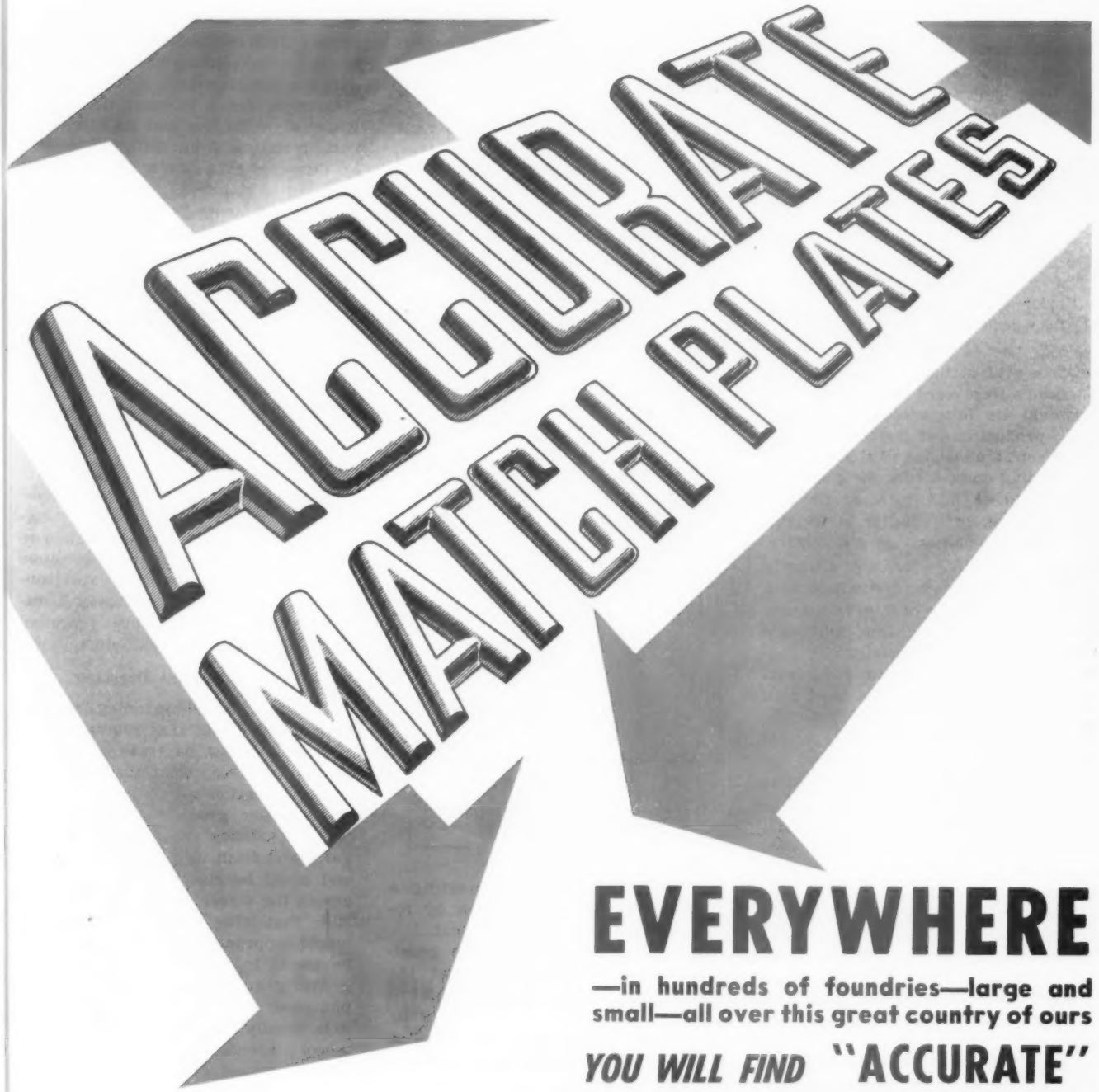
Tests Show Results

For purposes of comparison, we have secured actual test data from our engineering files, which demonstrate the results that might obtain from a border-line grinding application.

One case shows the results of two 24 x 2-in. grinding wheels, one a high-speed resinoid, the other a slow-speed vitrified wheel. In both cases, the casting being ground weighed about 5 pounds. The average stock removed per casting was approximately 1.5 per cent of the finished weight or slightly over 1 ounce. The rate of stock removal was practically constant for both methods of operation, 7 pounds per hour. A slight difference in abrasive cost per pound of metal removed, or per ton, was in favor of the vitrified wheel, but in this case, it was offset by the increased labor and overhead cost, and the final result was slightly in favor of the slow-speed method of grinding.

In a second case conditions were similar to those of the first except that the amount of stock removed per casting was 2 per cent or 1.6 ounces. Abrasive cost per pound of metal removed was comparable; however, the higher rate of production of the resinoid wheel made possible a material reduction in labor and overhead. The final result showed a 16.7 per cent saving in total cost per pound of metal removed in favor of the high-speed resinoid wheel.

(*Continued on page* 188)



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(*Continued from page* 186)

Summarizing these two examples, we can safely conclude: Where contact time is short and the per cent of metal removed is small (under 1.5 per cent) the slow-speed vitrified wheels may give the best economy. Where the contact time is long and the per cent of metal removed is substantial (over 1.5 per cent) the high-speed grinding method should give the best grinding economy.

The fourth question of this group is "Information on life of 18 x 2 x 2½ in. wheels in hard iron grinding".

From the foregoing discussion, it must be evident that unless all of the conditions were very nearly identical, it would be impossible to compare total production of castings. Farm implement malleable and similar castings, would undoubtedly show a much different cost and rate of production than castings similar in weight, for such applications as automotive.

The total usable volume of abrasive in an 18 x 2 in. vitrified wheel to a discarding diameter of 8 in. is approximately 408 cu in. One malleable foundry, processing malleable iron pipe fittings ranging in size from ¼ to 1 lb. grinding in the hard with 18-in. silicon carbide vitrified wheels, produces approximately 298 lb of hard iron castings per hour—74.3 lb of castings per cubic inch of abrasive.

Grinding Costs Vary

The total weight of castings produced by an 18-in. wheel would be approximately 30,220 lb. With a net cost of an 18 x 2 x 2½ in. of $20.13, our abrasive cost per ton of castings would be $1.33. We have known hard iron, farm implement castings, to be produced on vitrified wheels at a very small fraction of this cost (as low as $0.10 per ton).

Usually 18-in diameter wheels are used to discard at the original mounting speed. An 18-in. wheel operating at 1250 rpm has a peripheral speed of 6000 surface fpm. When the wheel has worn to 12-in. diameter, the peripheral speed has automatically reduced to less than 4000 surface fpm—much too slow for efficient production or economical use. Usually a difference of around 1000 fpm represents a difference in grinding action of about one grade.

It has been our observation that, normally, the production of very light weight castings, either hard or annealed, represents a small percentage of the foundry output. They are usually ground on stubs of larger wheels, moved down and speeded up on a smaller floor stand. Because stubs are used in many cases, abrasive cost is no factor inasmuch as the stubs have no further value in regular production. Their cost may be ignored.

Much greater economy can be obtained by using larger wheels as in the case of the comparison of 30" and 24" wheels.

Mechanics of Grinding—The first question in this group is "Do you advise a filler in soft iron wheels?"

These so-called fillers, made up of waxes and resins, usually are effective in minimizing wheel face loading. To be most effective, the filler should have the proper softening point. If a filler having a melting point of 100° F were selected and the grinding operation consisted of very light stock removal, we would expect very little advantage for the filler as a grain lubricator. In fact, in this case its

effect might be that of creating a much harder grinding action by retarding the grain depth of cut.

Fillers should soften at the grinding temperature in order that the surface grains may be properly lubricated and the metal chips more easily shed from the abrasive wheel pores.

Fillers appear to be more effective on vitrified wheels than on resinoid, due to the character of the pores. The resinoid bond itself becomes more or less plastic under the higher temperatures of grinding, and therefore does not require additional lubricant.

The second question is "How much dressing does a wheel need, or should the grade be correct so as not to need it"?

Abrasive wheels are usually dressed for two reasons: (a) To improve cutting action by knocking out or fracturing dulled surface grain. (b) To restore wheel face shape, correct run out, restore sharp corners or remove wheel face grooving.

If wheel dressing is for the purpose of improving the cutting action, a very light dressing is all that is necessary. We find, however, that it is customary in many foundry cleaning rooms to dress the wheel until all discoloration has been removed. Such methods are indeed costly and result in no improvement in grinding action over a light dressing.

Consider for a moment the actual wheel abrasive loss and its attendant cost, resulting from different depths of dressing cuts. Even a very light dressing removes approximately 0.005 in. of depth from a 24 x 2 in. wheel, and actually dresses away 0.754 cu in. of abrasive. At a unit cost of $0.04 per cu in., each dressing would, therefore, cost $0.03. In a large number of instances, by far the greater volume of wheel abrasive is dressed away, rather than worn away by actual grinding. The frequency and extent of wheel dressings actually determines the abrasive cost on many jobs.

This brings up the second part of the question, "Or should the grade be correct so as not to need it?"

Swing frame grinding wheels seldom require dressing with star dressers. The entire wheel face is in contact with the work, and usually a sufficient amount of pressure is applied to cause a normal breakdown.

Wheels Require Dressing

On floor stand grinding wheels, many casting patterns require infeed cuts and cannot be traversed across the wheel face. Continued grinding on one location necessitates the use of a harder grade to eliminate the rapid tendency to groove. If the gates and flash were easily accessible and could be removed by traversing across the wheel face, it is quite possible that wheel specifications which would approach self dressing could be used. In order that rapid wheel grooving and corner wear caused by plunge or infeed cuts can be reduced, it is usually necessary to make use of wheel specifications that require periodic wheel dressing.

Occasionally we find foot lever arrangements designed to produce increased pressures of castings against the wheel face. It is always necessary to utilize harder grades of wheels under these heavy pressures, than when only body pressures are used.

For best economy on floor stand grinding, it is therefore necessary to select a grade of wheel sufficiently strong to handle the larger percentage of difficult grinding.

Application—In this group the first question is "Do you advise different grade wheels for various jobs in average run of castings made?"

We assume this question refers to various types of either hard iron or annealed malleable castings suitable for floor stand grinding. Some foundries make a practice of grind-

(*Continued on page* 190)

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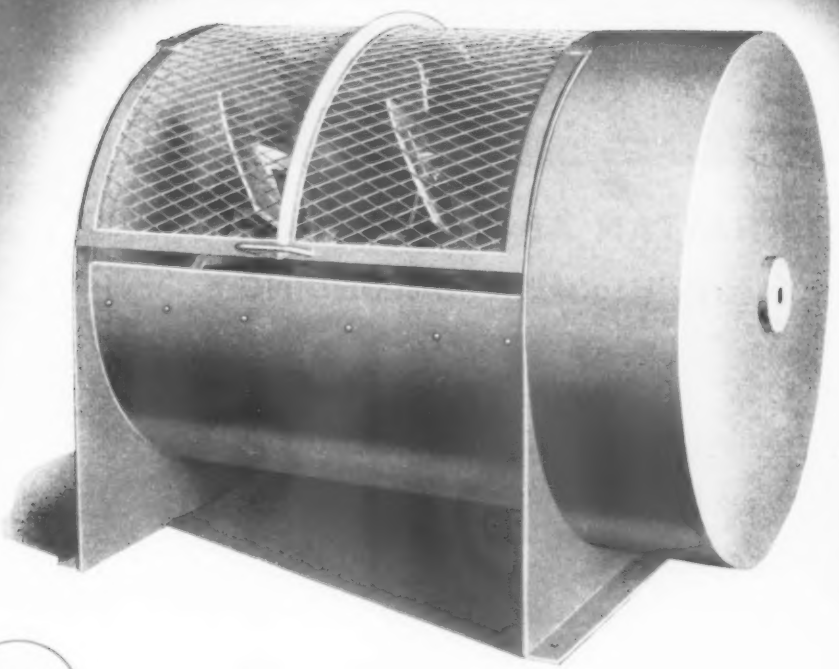

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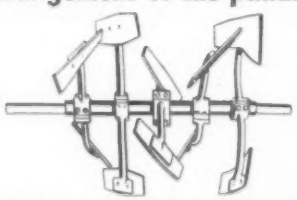

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MIXES IN 4 MINUTES • DISCHARGES IN ½ MINUTE!

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MULTI-MIXERS are sold only thru nationally known foundry and equipment dealers. Consult your supply dealer or write direct.

MULTIPLEX MACHINERY CORP. ELMORE, OHIO

(*Continued from page* 188)

ing both hard and soft malleable on the same type of abrasive wheel. We have also observed malleable as well as special wear-resisting alloys being ground by the same type of wheel.

We do not intend to take issue with any individual manufacturer regarding the methods dictated by their experience.

In cases where large quantities of castings of wide characteristics are continually being produced, it is possible that an overall savings might be made by selecting wheel specifications best suited for each particular material. Otherwise, it becomes necessary to make use of specifications favoring the harder, more sensitive, materials. Such wheel specifications may prove to be more costly when used on the softer, more ductile materials.

Remounted on Swing Frame

In some cases, where an abrasive wheel might be mounted on a floor stand, used to a specific diameter, then remounted on a swing frame, a composite type wheel is found desirable. This type of wheel is manufactured of two different specifications occupying two annular zones, each of which is well adapted to the operation to be performed. Such an arrangement is found necessary if the swing frame grinding operation utilizes considerably more pressure than the previous floor stand operation.

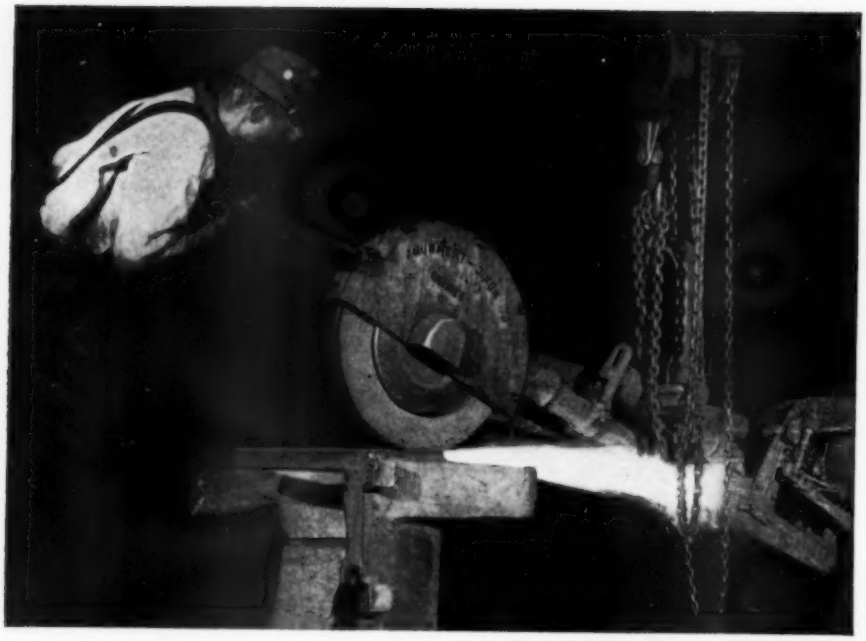
The second question is "Can a combination wheel of resinoid and silicon carbide be operated at high speed and produce better results?" This question refers to high-speed grinding of hard malleable and the comparative results that might be expected between silicon carbide abrasive and aluminous oxide abrasive.

It has been our observation that malleable foundries, as a rule, divide castings into two classes. Castings having light gates and fins are ground in the hard, while those having heavy gates and risers are ground after annealing.

Silicon carbide abrasive is better adapted to hard iron grinding than aluminous oxide, although we find many foundries utilizing wheel specifications of South African corundum or some of the more friable types of artificial aluminous oxide abrasive for the same purpose.

Whether or not heavy sections can be satisfactorily removed in the hard state, with high speed resinoid wheels, is a controversial subject. The high localized heat of abrasive in high-speed grinding will very likely re-

(*Concluded on page* 192)



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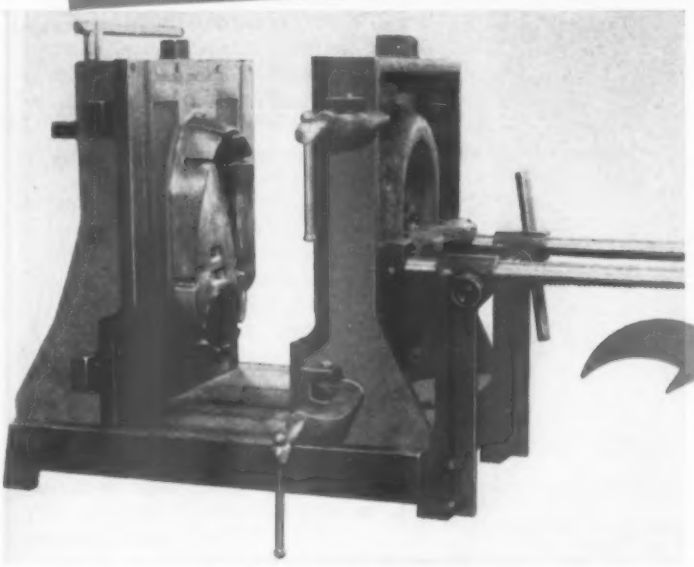
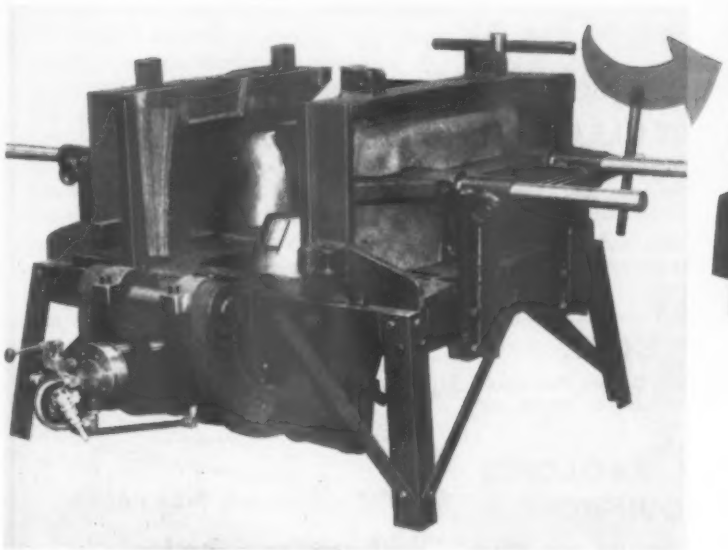


MANUAL PERMANENT MOLD



SEMI-PNEUMATIC PERMANENT MOLD

ALUMINUM CASTING

Permanent Mold Aluminum castings are, without a doubt, the answer to economical, quality production . . . And because Master Pattern designed and built the molds shown above, the customer got off to a "flying start" in his production. Suffering little if any delays due to adjustments or the need to eliminate "bugs" in the molds.

In Large Quantities, Quickly · Economically

Master Pattern has designed and built hundreds of aluminum permanent molds over a period of more than ten years . . . Their experience, knowledge of design and the ability to take casting specifications and build molds ready for immediate operation is known and respected. Send your next casting problem to Master Pattern and be certain of getting the right answer. Write now!

MASTER PATTERN COMPANY

1315 MAIN AVENUE — CLEVELAND 13, OHIO

DESIGNERS AND MANUFACTURERS OF PERMANENT MOLDS, WOOD AND METAL PATTERNS AND MODELS

FOR *Real* ECONOMY

Use

20th CENTURY NORMALIZED

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Licensed Under
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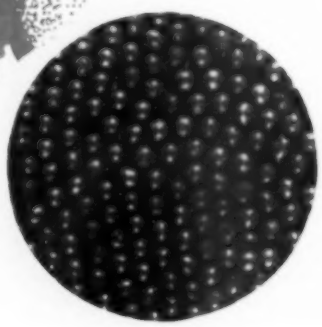
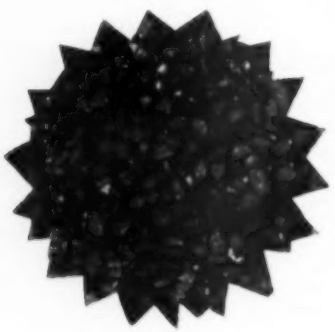


SHOT • GRIT



You—

CUT YOUR BLAST CLEANING ABRASIVE PURCHASES IN HALF.

20th Century Normalized Shot and Grit last at least twice as long as ordinary abrasives.

YOU GREATLY REDUCE YOUR FREIGHT COST.

By lasting twice as long, 20th Century Normalized Shot and Grit mean big savings in freight and freight handling.

YOU GREATLY PROLONG THE LIFE OF EQUIPMENT.

20th Century Normalized Shot and Grit insures less time out and less cost for repairs. Equipment maintenance is reduced from 50% to 75%.

•

20th Century Normalized Abrasives are stress relieved. There is practically no shattering. Most modern screening process assures greatest uniformity in sizes.

•

IMMEDIATE SHIPMENT

THE CLEVELAND METAL ABRASIVE CO.

Main Office and Plant: 887 East 67th Street, Cleveland 8, Ohio

Howell Works—Howell, Michigan

(*Concluded from page* 190)

sult in hair-line checks which may or may not be healed over in subsequent tumbling operations after annealing. In many types of castings, these checks are not objectionable.

From the standpoint of purchase price, a silicon carbide resinoid wheel would be considerably greater than an aluminous oxide abrasive resinoid bonded wheel. We have no comparative data to show what the actual abrasive cost per pound of metal removed might be.

In our opinion a resinoid bonded wheel of silicon carbide abrasive should produce better grinding characteristics on hard iron than might be expected from aluminous oxide resinoid wheels.

The third question is "What grain and grade do most foundries use in soft and hard iron grinding?" We wish it were possible to answer this question in a simple statement.

Wheel specifications used in malleable as well as other foundries vary considerably. Wheel specifications must be suited to the types of metal, classes of castings, grinding pressures, labor rates, and cost requirements of the management. Apparently one type of wheel will not fulfill the requirements of all foundries producing similar castings. All are seeking to find a specification that will produce long life, yet possess the rapid grinding characteristics observed elsewhere, many times under entirely different circumstances. The universal wheel we so often hear mentioned, can at best be a compromise for the varied conditions in one foundry and seldom meets the requirements of another plant unless all conditions are very similar.

Stainless Steel is Contest Subject

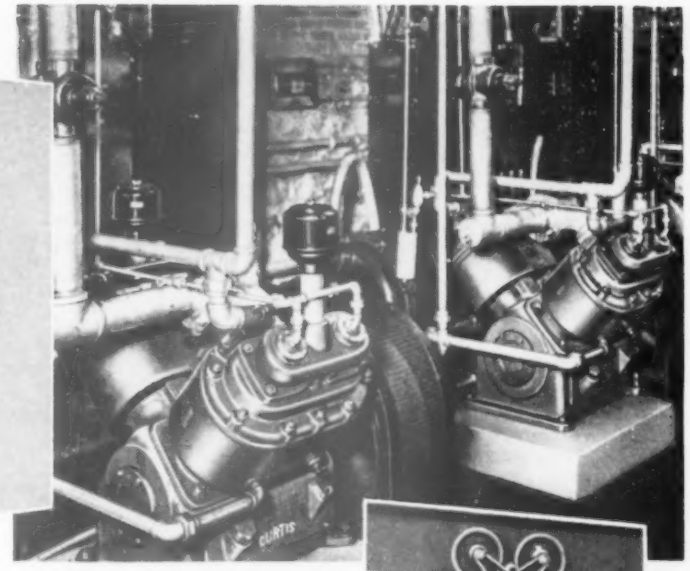
Cooper Alloy Foundry Co., Hillside, N. J., is sponsoring a series of contests to stimulate interest in applications for cast stainless steel, and to encourage advances in the battle against corrosion. Cash and prize awards totaling more than $5000 will be given for the best technical papers submitted.

Papers for the first contest, "Applications for Cast Stainless Steel in the Chemical Industry," will be accepted between Oct. 1 and May 1. First, second and third prizes are $250, $150 and $100, respectively, with 100 stainless steel paper weights as additional prizes.

Complete information and rules for the contest may be obtained from the company.

Reduce Production Costs with CURTIS

AIR COMPRESSORS, AIR HOISTS AND AIR CYLINDERS



Plant after plant is turning to Curtis Air Hoists and Cylinders for pushing, pulling, lowering or lifting operations... and to multiple installations of Curtis Air Compressors, which eliminate long air lines, the possibility of air leaks, and losses resulting from breakdowns of central air compressor installations.

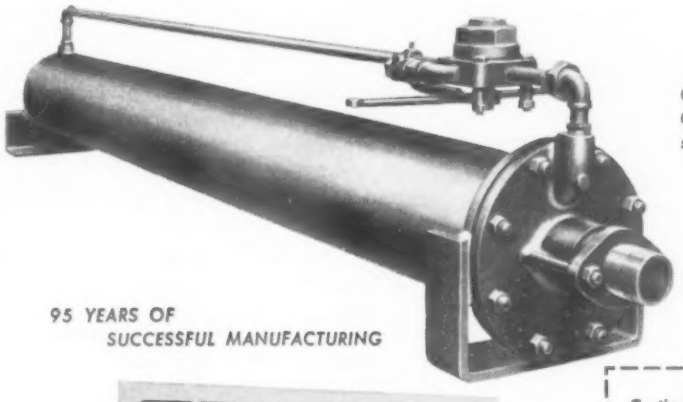
Here's why it will pay you to consider CURTIS *equipment*

AIR HOISTS AND AIR CYLINDERS

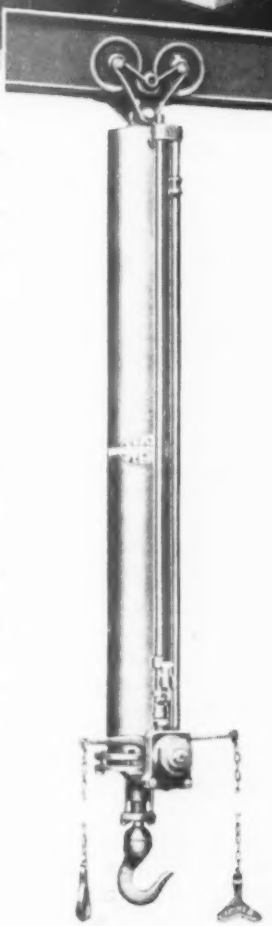
- Cannot be overloaded.
- Hoisting or lowering speed is controlled by operator.
- Ground-steel cylinder.
- Disc type valves.
- Valve automatically returns to vertical position when released.
- Can be operated by unskilled labor.

AIR COMPRESSORS

- Timken-Bearing equipped—permits external adjustment.
- Self oiling—positive lubrication.
- Precision construction throughout.
- Complete valve assembly removed or replaced in a few moments.
- Cylinder, crankcase, also heads made from gas-tight iron.
- Fully enclosed.



Curtis bracketed-type Air-Hoist Cylinder can be placed in any position from horizontal to vertical.



Curtis Pendant Air Hoist can be used for practically any lifting problem where the head room is not limited.

95 YEARS OF SUCCESSFUL MANUFACTURING

CURTIS

PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
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Curtis Pneumatic Machinery Division of Curtis Mfg. Co. 149-4
1922 Kienlen Avenue, St. Louis 20, Missouri

I am interested only in items checked below:

- ☐ Air Hoists
- ☐ Air Cylinders
- ☐ Air Compressors

NAME_____
FIRM_____
STREET_____
CITY_____ ZONE____ STATE_____

The Foundry

AND AIR POLLUTION

By JOHN P. AHERN
Executive Director
National Foundry Association, Chicago

THE desire for cleaner air is not confined to the large industrial centers nor is it the sole concern of any one group. It is the concern of the community—of employer and employee, home owner and tenant, elected officials and civic groups. It represents the universal demand of everyone in this country for good and healthful living.

Air can be polluted in many ways —chiefly by gas, dust, dirt, odor and vegetable matter. The most familiar gas pollution is that by sulphur gases emitted through the consumption of sulphur-bearing fuels for domestic, commercial, and industrial uses. Other types of gases are of the fluorine type, generally found near chemical and steel plants, and certain foundries; chlorine gases emitted from aluminum foundries; and nitrous oxides from diesel engines.

Dust pollution, since it can be seen and felt, attracts greater attention. It usually comes from combustible solids—soot, oil particles, abrasion from trees and plants, auto tires, etc.—and other dustfall—fly ash, sand, soil, building materials, abrasion from buildings, etc. The foundry is mainly concerned with the suppression of dust.

Cupola operation has many spectacular qualities, particularly during the light-up period and the beginning of the heat. The dramatic nature of a roaring fire and smoke rushing from a stack has made our industry not a little vulnerable in the eyes of the public, when the subject of cleaner air comes up. Whether a foundry is situated in an isolated section or is near a residential district, it is likely to be pointed to as the sole source of any contamination that exists. As a matter of fact, dust conditions are usually affected by these three factors:

1. The commercial, industrial, and transportation activities in the community. 2. The weather and topography of the community and the surrounding territory. 3. The efforts on the part of the citizens of the community to reduce air pollution. In any determinative survey made, it would be well to keep these three factors in mind since they illustrate why it is impossible to compare one community with another.

In looking at factor No. 1 it would be obvious that the contribution of a foundry in a large steel producing area, or near a great railroad freight transfer point, would be negligible.

To illustrate factor No. 2, the seasonal dustfall pattern in Chicago is more nearly like the seasonal average wind velocity pattern than the seasonal coal consumption pattern. Thus it appears that the amount of dirt picked up and blown around by the wind is more important in determining the amount of dustfall in Chicago than is the dirt coming directly from chimneys as the result of combustion of coal. In Pittsburgh, dustfall records indicate that with all industries down, if a heavy atmospheric lid exists, a large dust deposit is found all over the city. When there is no lid, with all the mills running full, a small deposit is found. This means that dustfall really measures weather conditions and is not a true measure of combustion.

These factors can be used as the basing points for informational surveys which may be instituted by local authorities and civic groups. They also should be considered if legislation is being amended or drafted in a locality.

All communities cannot afford to make surveys of the incidence of air pollution. Investigation can be costly. Yet, lack of accurate information can lead to unreasonable plans. As an illustration of the cost in a large city, Chicago, one proposal for a survey of atmospheric pollution ran $50,000 over a 3-year period. To permit a community to act on plans or ordinances, not based on fact, however, can result in an ordinance hostile to our industry.

Cincinnati and Los Angeles are now undertaking long-term surveys. Cleveland has just completed one. Some of the work is tax supported. In Cincinnati most of the funds are provided by the Kettering Laboratories of Applied Physiology. Help can also be secured from local and state departments of health, the U. S. Public Health Service, Weather Bureau, and the Bureau of Mines. Fuel companies have a vital interest, and further aid is available through private industry, colleges and universities. The National Foundry Association has been an excellent clearing house for information.

Because of the localized nature of air contamination it is inconceivable at the present time that corrective measures will be inaugurated by other than local authorities, although the Illinois State Legislature this year considered an appropriation of $25,000 for the study of air pollution.

Smoke Violation Defined

In early 1946, Chicago added to its City Smoke Ordinance—this definition of dense and therefore illegal smoke (definition in italics): "It shall be unlawful for any person owning or in charge of any smoke stack of any locomotive, tar kettle, steam machine or contrivance, or of any open fire, smoke stack, or chimney of any building or premises to allow the emission of dense smoke except for a period of or periods aggregating six minutes in any one hour at the time when the fire-box is being cleaned out or a new fire being built therein, *during which period of or periods aggregating six minutes in any one hour, the emission of smoke of a shade or density greater than Number Three of the Ringlemann Chart as published by the United States Bureau of Mines, is prohibited.* Such emission of smoke is hereby declared to be a nuisance, and may be summarily abated by the deputy smoke inspector."

So far as foundry operation is concerned, such a prohibition can be highly restrictive. At almost the same time the number of persons in the Smoke Inspection and Abatement Commission, under a deputy smoke inspector, and acting as "smoke observers" was increased from two to seven. These people have "the right to enter any building or premises and any and all parts at any reasonable time, etc."

A proposed ordinance in Utica, N. Y., regulated the amount of fly ash "so that the quantity of fly ash shall

(*Continued on page* 196)

FOR GREATEST EFFICIENCY AT LOWEST COST

DESULFURIZE with SODA ASH

For a Special Soda Ash At No Extra Cost

Specify

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TRADE-MARK REG. U. S. PAT. OFF.

2-10 SODA ASH

Especially Designed for Desulfurization

★ MEDIUM GRAIN SIZE

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SOLVAY SALES DIVISION

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40 RECTOR STREET, NEW YORK 6, N. Y.

HAUSFELD FURNACES

FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page 194*)

not exceed 0.75 grains per cubic foot of flue gas at a stack temperature of 500° F, of which amount not to exceed 0.2 grains per cubic foot shall be of such size to be retained on a 325 mesh U. S. Standard Sieve. These conditions are to be conformed to when the percentage of excess air in the stack does not exceed 50 per cent of full load." While the ordinance was at least specific, it could hardly have taken into consideration some tests of cupola discharges which indicated that compliance would be difficult unless special equipment, such as a cupola wet process spark suppressor, was installed.

Other of the countless ordinances state that stack discharges shall not carry solids in excess of 0.4 grains per cubic foot irrespective of particle size or gas temperature in the stack.

I am mentioning these details because they attest to the importance of being alert to existing or proposed code requirements. If you can, don't hesitate to offer advice if you think your industry will be adversely affected.

Install New Equipment

Installation of corrective equipment appears to fall in the category of nonproductive capital expenditure. In these days of highly competitive business conditions the average small and medium size foundry is reluctant to spend money for other than cost reducing equipment. However, equipment manufacturers are developing newer and less costly designs for suppression of cupola discharges. In some instances, enough economies may result to make the outlay worthwhile, if financing can be carried through.

Daily operational suggestions to minimize discharges would include a well planned balance of air and fuel to achieve a practical minimum of discharge of gases and solids. Fuel suppliers can be of help in arriving at proper proportions, as also can equipment manufacturers and commercial laboratories.

During the light-up period of cupola operation, especially when wood kindling is used, excessive discharges can be reduced by having a completely glowing wood fire before any bed coke is charged. Other methods of lighting—electric, gas, and oil—can further reduce the density of discharge during firing.

At the end of the heat, great care in discontinuing the forced blast earlier than the usual practice results in a reduction of fly ash dis-

charge from the top of the stack.

Some companies have added to the height of their stack and have even introduced forced air near the top of the stack to achieve more complete combustion and reduction in the emission of gases and solids.

In any action designed to abate atmospheric contamination, there should be representation of our industry by well informed and able foundrymen. Such action can best be inaugurated through the medium of so-called Cleaner Air Committees in co-operation with a local chamber of commerce. This type of committee, acting with local authorities, can act as a steering and fact-finding group. It can help in drafting ordinances for the suppression of pollution, if any are being considered. Finally the committee can encourage continuance and improvement of the activities and methods being used to lessen the contamination.

I would like to think that the solution to the air pollution problem lies in the declaration of the amiable Indiana homemaker who said she would never again complain about the effect of the steel plant smoke in the city of Gary on her clothesline "just so long as these men of mine have a job." Despite her desire for a busy industrial economy, we must be considerate of her. Neither today nor tomorrow can all of us afford to purchase the equipment to suppress the nuisance. Perhaps the best approach is to face the problem, admit any responsibilities we have, and above all tell the people of our communities what we are doing about it.

Book Review

Refractories, published by General Refractories Co., Philadelphia, cloth, 272 pages, 8½ x 11 in. Price $5.

The book is intended to serve those who design, use, purchase, construct and supervise the operation of equipment requiring refractory materials. It begins with a brief history of refractories and includes a history of the General Refractories Co.

A section of the book lists, pictures, and gives dimensions of all standard refractory brick sizes and shapes. Another deals with the properties and behavior of refractories. Information is furnished on construction with refractories, and tables that simplify the calculation of numbers and types of brick needed, are included.

Practices concerning ordering and shipping of refractory materials are discussed. At the back of the book is a glossary of industry terms.

OUR PLANT ENGINEER CALLED IT A "POWDER PUFF FACTORY"

"We liked the location and the size, but when we figured on increasing crane capacity, the structure just wouldn't take it. Our plant man finally gave up in disgust saying, 'They must have built this shop for a powder puff factory.' "

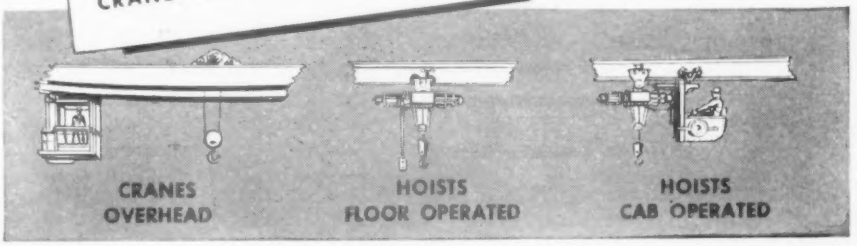
"When we decided to build, you can bet we planned *in advance* against the possibility of a future need for greater crane capacity."

"The Shepard Niles specialist was a great help in this planning. He seemed to know just about what loads were maximum in different types of industry. We were guided, to a great extent, by his suggestions."

The time to plan for most economical materials handling is before the building is built or the remodeling completed. Ask the Shepard Niles specialist to sit in—he has lots of experience behind him—and his sales interest is not concentrated on any one type of lifting tool.

SHEPARD NILES
CRANE AND HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads.



360 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

By PAT DWYER

Drawings by RICHEY

ADVENTURES OF Bill

THE last time I was over here," Bill said, "I was prompted to make a few random remarks about the Great Lakes, the big and little vessels that plow the waters, and the big and little men who, in various capacities, keep the vessels moving during the navigation season. By a curious coincidence, on the following day I met an old friend, Starboard Jim, who has sailed the Great Lakes since he was a boy. In our younger days and in the winter season Jim and I played in a band and were quite intimate. Then, through one reason and another, we separated and I lost track of him.

"I did not like to comment on his appearance. Kind of seedy and musty. His face was lined and when he removed his hat I noted an almost total lack of hair. When he saw me looking, he read my thought. 'You ain't no matinee idol yourself, Bill. I suppose you don't need to go to the barber more than once or twice a year.'

"I am willing to admit that my hair is not as luxuriant as it was in the old band days. Under a strong light and with a good reliable pair of spectacles, you probably will note that it is beginning to get thin—"

"'Thin?' says he. 'So is your aunt Maria. That is, provided you ever had an aunt Maria. On the other hand, as you might say, that reminds me of the biggest woman I ever saw. She sailed with us one trip on the old *Shawnee* many years ago.'

"I had a mind some time back to refer to Jim as an old pickled veteran. Since the lake waters are fresh, the term 'pickled' has not exactly the same meaning as when it is applied to deep-water, or rather salt-water sailors. Perhaps this minor point is not worthy of comment."

"Kindly omit the foot notes. I left the kindergarten many, many years ago."

"Really? I must make a note of that in my little black book. What I had in mind was an incident in the early career of the pickled one. He seemed to think it was kind of funny and—well—maybe it was at the time. Like many other alleged humorous items there is room for argument."

"You can't start any argument with me. I know what Jim meant and I do not need charts, diagrams, illustrations or micrographs. Majority of arguments start over nothing and end the same way. To any outsider the ignorance displayed by the contestants is equalled only by their firm belief in their own infallibility. All of which, my dear young fella, means you can skip the technical details, including the moisture content of the sample. Get on with the story—if there is a story."

"Certainly there is a story. If you keep interrupting you never will hear it—"

"The best news I heard today. Let's go."

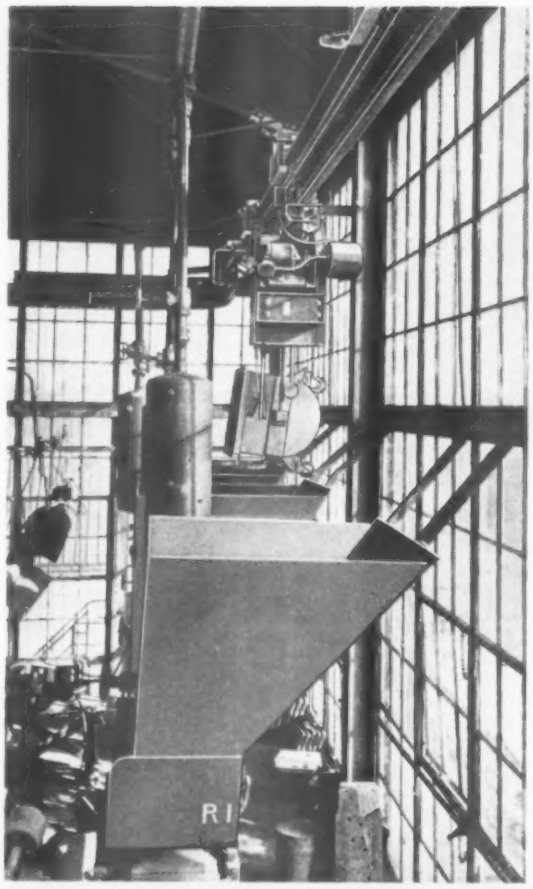
"One morning in the merry month of July, a majestic lady and her somewhat more streamlined and less majestic daughter boarded the *Shawnee* for a tourist trip to the head of the Great Lakes, and naturally back again. The *Shawnee* dragged a big heavy barge which cut her speed to about half that of the unincumbered members of the fleet. This feature furnished a lively source of debate, not only at fleet headquarters, but also among officers and crews. The bone of contention was whether the extra cargo compensated for the time consumed on the trip. What do you think?"

"I don't know anything about the subject. In the course of a long and, I trust, not wholly misspent life I have learned a very good rule. Never offer an opinion, or get into an argument over a subject with which one is not familiar. Another good rule is to stick to one subject. What about the beefy lady and her, no doubt, more streamlined daughter?"

"They came aboard accompanied by two trunks, half a dozen handbags and several hatboxes. Enough gear and rigging to go around the world at least once, in the sullen opinion of the men delegated to carry the stuff aft and dispose it in the guest cabin.

(*Continued on page* 200)

He isn't quite sure if what he sees is a sight, a vision, or a deep sea nightmare



AMERICAN MONORAIL *Systems*

Deliver Core Sand Fresh When Needed

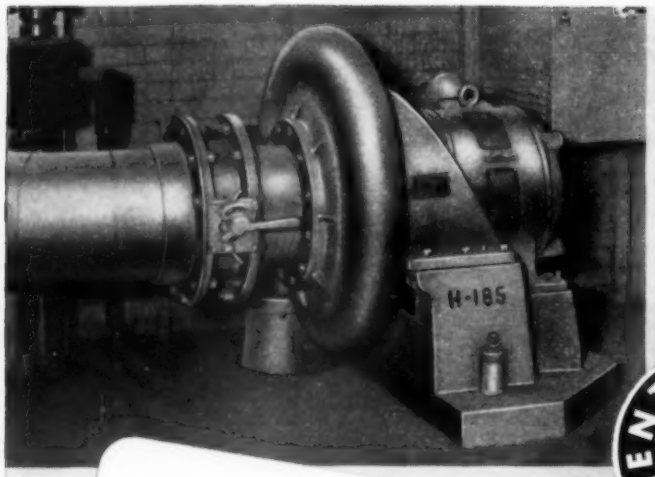
Many foundries are eliminating much of their floor congestion with American MonoRail handling systems, in addition to delivering small batches of fresh sand when needed.

One foundry automatically feeds 7 stations on each of 4 single tracks from muller. Station may be increased to sixteen on each track when required. Other foundries supply multiple station in single line by cab control or automatic control. These systems deliver, dump and return to muller by push button control or cab operated.

This is just one of many money and time-saving applications of American MonoRail systems in foundry operation. Let an American MonoRail engineer show you how in your foundry.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE CLEVELAND 7, OHIO

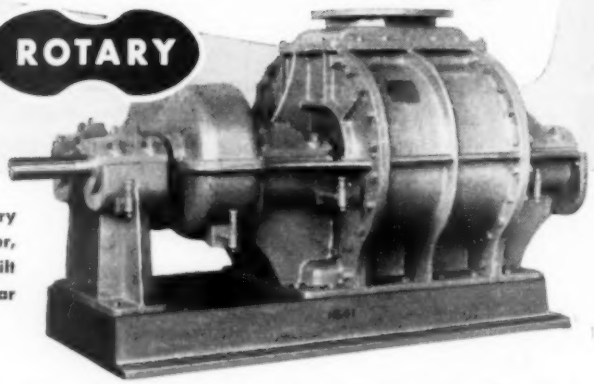


R-C Centrifugal Blower, Type OI, in foundry cupola operation. Capacity 4,400 CFM, 40 HP motor.

CENTRIFUGAL

R-C dual-ability plays no favorites!

ROTARY



Standard Rotary Positive Blower, Type RCD, built in 8" to 22" gear diameters.

With a wide choice of Centrifugal and Rotary Positive Blowers available, you can usually select standard R-C units to meet your specific applications. Capacities range from 10 CFM to 50,000 CFM or higher for special requirements. Roots-Connersville is the only blower manufacturer offering you this *dual choice.*

We're impartial as to drives, too. We supply them or you can utilize drives already available.

With R-C equipment on the job, you'll enjoy long-time, trouble-free performance. That's because of sound design and sturdy construction, based on 95 years of building gas and air handling equipment, *exclusively.* For any such problem, consult R-C *dual-ability.*

ROOTS-CONNERSVILLE BLOWER CORPORATION
910 Madison Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE

BLOWER BUILDERS • R-C • SINCE 1854

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

* * ONE OF THE DRESSER INDUSTRIES * *

(*Continued from page* 198)

This was the first in a series of incidents that widened the breach between lady and crew, a breach that might be traced to the old and well known superstition that a woman on shipboard is a sure source of bad luck.

"Crossing Lake Huron the vessel pitched and rolled a bit. This was regarded by the crew as a bit of a stiff breeze which knocked a knot or two off the speed chart. The old boys shook their heads and predicted worse to follow. Never knew it to fail with a woman aboard. Telling about the experience later in a travel talk before her club, the lady claimed it was the most severe storm in the history of the Great Lakes.

Well dressed man comes to town

"At the height of the storm she staggered into the captain's cabin and peremptorily ordered him to turn back and set her ashore at the home port. She was tired, sick and bruised —er—practically all over from banging against the walls and the furniture in the cabin.

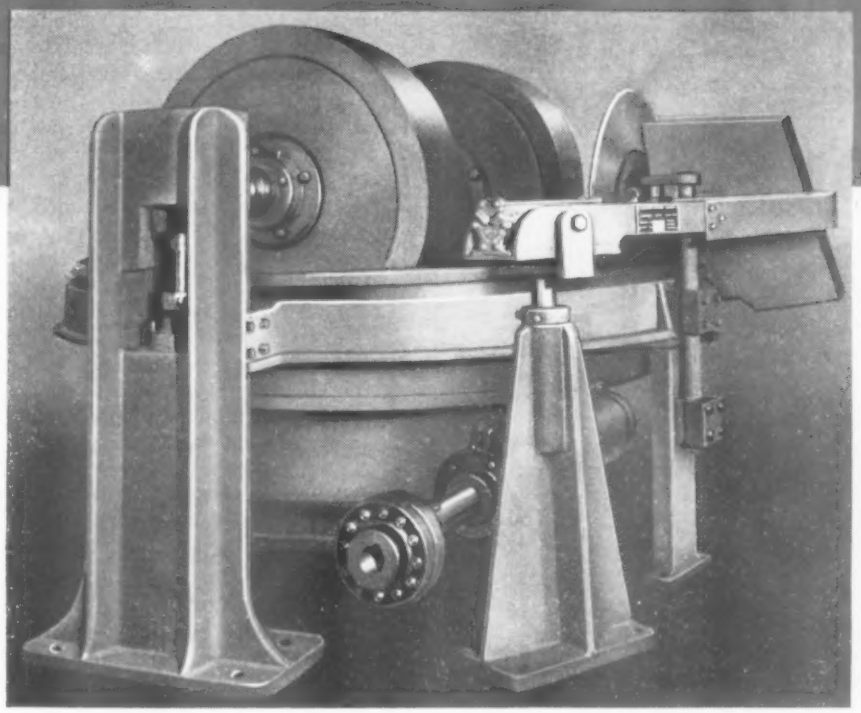
"As politely as possible the captain explained that he could not consider her suggestion. With a high headwind and with a heavy barge in tow the maneuver was impracticable. He was running on a definite time schedule to bring him under the ore chutes at a certain time. His job depended on keeping his place in the procession of ships that loaded and carried ore down the lakes.

"The lady dismissed the first and second items as not worthy of consideration. On the third count she played her trump card. She informed the captain coldly and acidly, that when and if they arrived at the Soo,

(*Continued on page* 202)

for large tonnage sand preparation
you can't beat a...

clearfield
930 MIXER



Because its capacity is 40 cubic feet per charge . . . because its rugged construction and simple design provide long years of trouble-free service . . . because it turns out sand exactly as you need it . . . and because it works equally well on either batch or continuous methods . . . the Clearfield 930 mixer can't be beat for dependable, economical large tonnage sand preparation.

There's a Clearfield Mixer to meet your every sand preparation need. Write today for Catalog No. 79 for a detailed description of all models.

CLEARFIELD MIXER
MIXES, TEMPERS AERATES

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

(*Continued from page* 200)

she would get in touch with powerful friends in the home office. These powerful friends would arrange to have the captain replaced by a man who knew how to treat passengers. In addition, she advised him to throw his certificate overboard. His career on the lakes was finished.

"With the Soo locks behind and Lake Superior stretching ahead for approximately 600 miles the lady ventured on an early morning constitutional. She surprised Puff Ball McCarthy in a Gunga Din costume—'nothing much before and rather less than 'arf of that behind.' He had come off a shift in the stoke hold, a cruel job in the old days before stokers were installed under the boilers. Sitting on a hatch coaming he leaned forward, modestly cast down his eyes, folded his arms across his red chest, and hoped the lady would not look in his direction.

"She came to a stop. She looked. She addressed Puff Ball. 'Good morning my good man. Are you not feeling well?'

"Through force of long habit the Puff never answered a question truthfully where a lie would serve as well and sometimes better. On this occasion he figured that if the lady assumed he was sick, he might just as well go along with the gag. 'No, ma'am,' he says, 'I ain't feelin' so good today. Maybe its somethin' I et.'

" 'Whatever it is,' she said, 'you should not sit there unclothed in the raw morning atmosphere. You should be in your bed. Come, here is my arm. I shall help you to your quarters.' He protested feebly and managed a few deep coughs.

"She dragged him off to the intense and carefully smothered amusement of officers and crew fortunate enough to be on duty. The wheelsman declared that as he hoped for eternal salvation, he saw her sink her teeth in the back of the victim's neck and drag him along as he had seen a mother cat drag her kittens. At a convocation of the lodge that night, properly tyled and so forth, the statement was regarded as an exaggeration. The wheelsman was admonished to keep his eyes on the compass card. The remainder of the session under the head 'Good & Welfare' was given to consideration of plans, as Scholar Jack said afterward, to properly deflate a balloon. He never used a one-syllable word where a two or three syllable word could be employed.

"Next morning, when the lady inquired how the patient had passed the night, she was told by a man planted there for the purpose, that Puff had a most distressing night. He had all the symptoms of a highly contagious disease. The speaker had been ordered to keep every person away from him. The following morning he was reported worse. When she inquired the third morning, the guard at the door lowerd his head, rubbed his sleeve across his eyes and just managed to whisper, 'Yes ma'am. He passed out just as the sun was peeping over the horizon. The funeral service will be at 4 bells, that is 2 p.m. central standard time.'

" 'You will take him to Duluth?' The lady inquired solicitously, 'and arrange to have the -er—remains sent to his relatives.'

" 'He ain't got no ralatives, ma'am. At 4 bells, over he goes into Lake Superior, right here where old sailors claim the lake ain't got no bottom.'

"He hurried below to help his fellow conspirators wrap three long fire bars and the stuffing from an old mattress into a canvas cover. Four men carried the bundle on deck and placed it gently on a plank with one end resting on the lee rail and the other end

(*Continued on page* 204)

Excess air supplied to the cupola can cause an inefficient iron-coke ratio and result in using more coke to melt the iron. Then too, extra power is needed to deliver the surplus air.

To prevent furnishing extra air use the I-R Motorblower with Constant Air-Weight Control. It automatically assures the specified amount of air, by weight, regardless of cupola resistance, or atmospheric and temperature conditions. The Constant Air-Weight Control, backed by 22 years of Foundry use and a long list of successful installations, requires no laboratory conditions for accurate regulation of the air blast.

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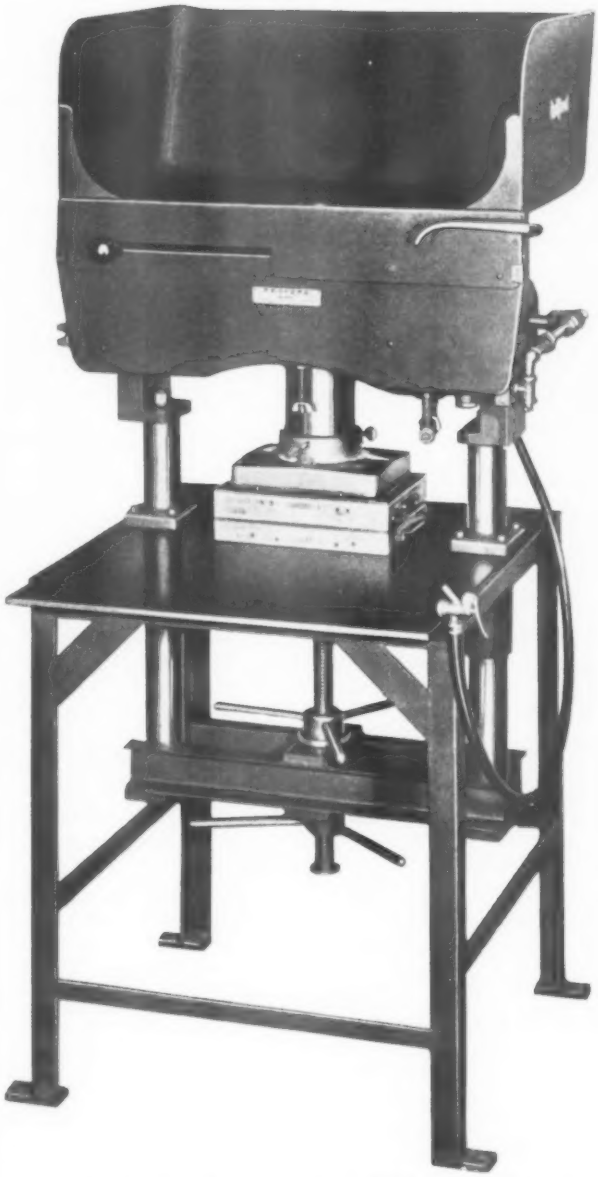
STATIONARY MAGAZINE TYPE



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2. Large sand supply hopper directly in front of the operator and readily accessible.

3. Stationary sand magazine that has a unique loading device eliminating the usual time and effort consuming operation of moving the magazine from filling to blowing position.

4. Easy accurate locating of core boxes against stationary magazine heads.

5. Quick change magazine heads or Redford Sand Cartridges.

6. Quick adjustment for different height core boxes.

7. Quick change, fully adjustable, automatic clamping attachment for vertically split core boxes.

8.* Actuating one handle puts the machine through the complete cycle of clamping the core box, blowing the core and releasing the core box, in two seconds.

*Any core blowing machine will blow a core in a few seconds. Related operations and human fatigue are the important factors in setting your rate of production. The New Redford has been developed to give both unequalled performance and unequalled ease of operation.

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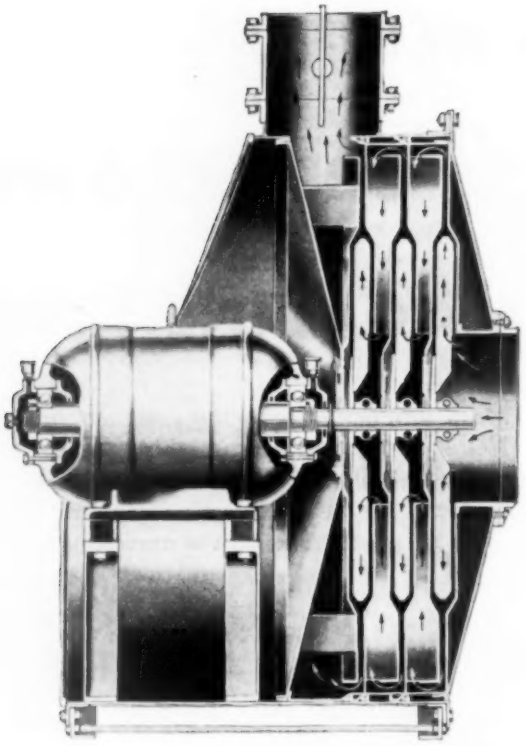

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Blast Gates	No. 122
Technical Bulletin	No. 126

TURBO-COMPRESSORS

332-E

(*Continued from page* 202)

resting on a wooden horse hastily knocked together by the carpenter. The outfit was covered with a tarpaulin.

"At 4 bells the lady and her daughter joined the crew and waited for the captain to read the burial service. Properly horrified at the information that 'there weren't to be no burial service,' she announced autocratically that she would officiate. She sent her daughter back to the cabin for a suitable book, from which she read a number of extracts. Then the two ladies sang a hymn while the crew kept their heads down and almost blew their gaskets. Finally she raised her hand to indicate the service was over. The plank was upended and the effigy with the iron fire bar core plopped into Lake Superior and dispappeard.

"Through the well known grapevine telegraph the news was relayed up and down the lakes. Such is the sense of humor amongst the great bulk of the men who work the Great Lakes fleet, the story, with occasional variations, never fails to win sincere and hearty applause from one and all."

"Did the lady ever learn of the hoax?"

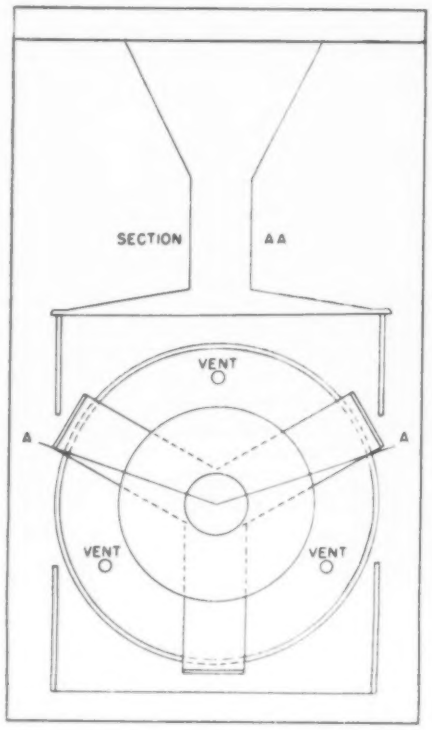
"Puff Ball did not say. Probably considered the item of no importance. In some respects sailors have remarkably short memories. With your kind permission, we shall now consider a request I had the other day from a citizen who was having trouble with some of his brass castings. I should like to stand by and watch every step in the process of making the molds and melting and pouring the metal, but since that is out of the question, I had to assume certain things and then build up a diagnosis. Here is what he wrote:

We are experiencing difficulty in making yellow brass ferrules 4 in. diameter and 5-in. in length. The pattern is for four castings in a 14-in. square flask, 7-in. drag, 3½-in. cope. We have gated the four from one central sprue. We also have gated them individually with four gates to each ferrule. With either method the molds do not run full. The yellow brass is melted and poured at the proper temperature. Patterns are machined with 0.006-in. taper. Bottom thickness is 5/64-in.

I replied as follows:

Assuming that sand contains a minimum amount of moisture, metal is at maximum temperature and fluidity, and the cores are properly vented, the most essential feature in the production of these castings is maximum pouring speed. Metal in the thin section solidifies almost instantly in contact with the sand. Naturally the speed is intensified where the sand is damper than necessary. The core is entirely surrounded

with metal, therefore provision must be made for the rapid escape of gas and steam. With metal at maximum pouring temperature, the fluidity is increased by the addition of a small amount of aluminum, about 2 oz. per 100 lb. Preferable method for venting the core before the cope is lifted is to drive an ⅛-in. vent wire from the top of the cope, through to the bottom of the drag. The three vent holes



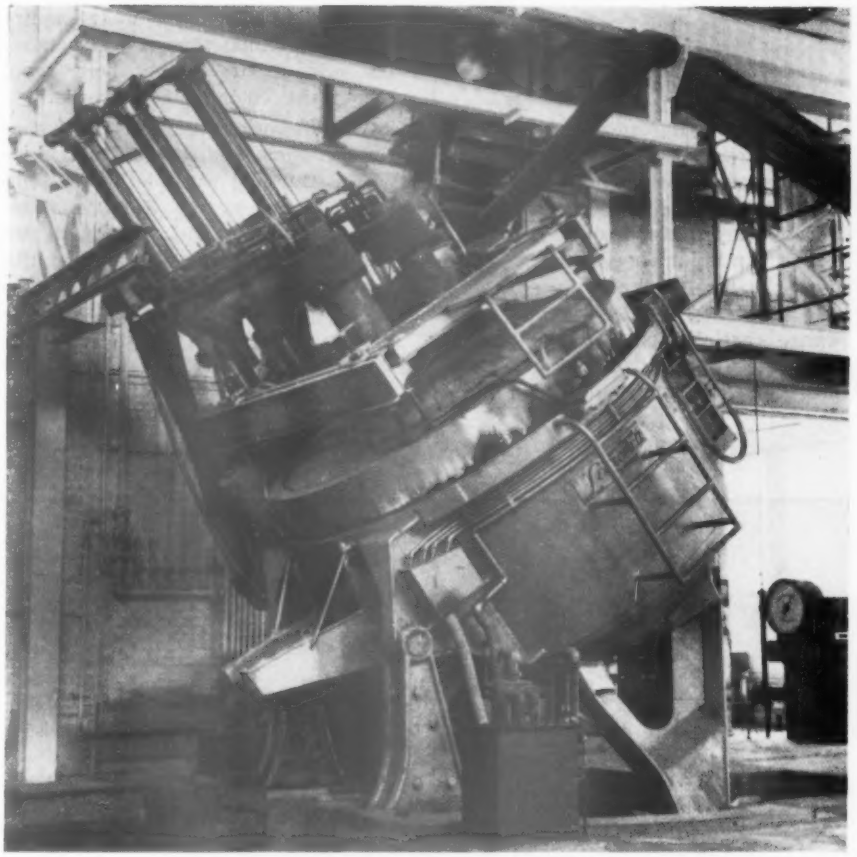
Suggested gate for thin ferrule

are located between the three gates as shown in the accompanying sketch. Where the cope and drag are made separately, either by hand or on adjoining machines, a gage may be employed to locate the vent holes in each part.

The pouring should be done by a skilled operator who judges instinctively the proper amount of metal to pour in each sprue. With a little experience he can *cut 'er short,* so that only about 1 in. of metal remains in the sprue. No need to fill the sprue to the top on these thin castings. This is only a minor item where the production is limited to a small number of castings, but it represents an appreciable amount of metal where the production is large.

We are inclined to the opinion that no gating system can be developed to distribute metal satisfactorily to these four castings from a central sprue. The castings can be made four in a flask as at present, but they should be gated and poured individually.

The membership and public relations committees of the National Foundry Association have completed the 1949 manual of services, which outlines the function of the NFA in the foundry field. The booklet will be distributed throughout the industry.



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FOUNDRIES — PAST AND PRESENT

(*Continued from page* 71)

cooled they were passed on to the cleaners who worked in the open air while other slaves, armed with metal-loaded whips, stood over them, to correct and punish mistakes, or to drive them to faster work.

In cleaning and polishing the bronze castings, part of the process intended to bring out the special luster of Corinthian vases, demanded that women polish the metal against their own skins; thus, it was believed, the oils of the human body would soften the color of the bronze.

The Egyptians developed high artistic forms and useful articles of trade. Our lost wax method of today is the same as the Egyptians used centuries ago. The cope and drag method of molding was an Egyptian contribution to the industry. Bruce L. Simpson, a keen student of the metal castings industry, declares "due largely to her casting ability, Egypt was able to rule the western civilized world for nearly 2000 years."

The Phoenicians were traders as well as craftsmen, the Greeks refiners, the Romans imitators. Toledo steel, made in Spain by a cementation process, enabled Rome to conquer and rule for a span of 600 years.

During the Dark Ages from the fall of Rome in 476 A.D. to 800, the time of Charlemagne, there was no development in any form of human progress in western Europe, and much that had been known earlier was lost and forgotten. The knowledge of founding managed to survive through the needs of the Christian Church. Bells, fonts, metal doors and censers had to be made and founders were needed to produce them.

From the time of Charlemagne to the Renaissance, there were a few major developments in smelting processes and some in metallurgy but none in the methods of producing castings. Late in the Renaissance, 1400 A.D., came the development of loam molding and also the first book dealing with foundry practice. Its author was Vannochio Biringuccio. He is entitled to be called the father of the founding industry because he was first to publish the data available in his day.

Guilds Spread Information

The guild system of the Middle Ages helped to advance the knowledge of founding in various ways. Their high standards of workmanship insured the production of good castings. The guilds admitted to their membership workers in nonferrous metals as well as those who were casting objects from iron furnaces.

Another great development of the late Renaissance was the manufacture of pig iron. This, coupled with the effects of the discovery of steam power and the greater use of water power and mineral fuels, led directly to the industrial revolution.

It is significant that the institution in which we are gathered came into being as a tribute to Benjamin Franklin who, of all Americans, did most to further the scientific approaches to industrial development in the early days when men brought intelligence to bear in the struggle of man against things. It was he who constructed the first stove of cast iron and his experiments with the elements led to many useful developments which aided the entire castings industry.

It is noteworthy that the steel casting industry had its early beginnings within a radius of 25 miles of Philadelphia and that the date of the founding of the Franklin Institute coincides with the date of the begin-

AJAX-WYATT ELECTRIC FURNACE

This line frequency induction furnace, so universally used in the wrought brass industry, is now, because of improved linings, available for melting ferrous alloys used in the foundry industry.

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ning of the industrial revolution in the United States.

Perhaps the most auspicious outcome of the many political revolutions was to free men from various types of human bondage to other men. The industrial revolution, still in progress while I speak, serves to free *men* from things—from drudgery, danger, disease, and economic disaster. Through inventions man is building mute slaves of the elements, forcing nature to serve, instead of slay him.

Only a few months ago I received from a Swiss friend a copy of a rare book on mining, printed in 1621 and entitled "Bergwerk Buch," or in English, "Mining Book" by George Agricola. The book is replete with wood cut illustrations revealing that human beings were employed to perform labor tasks which we would not assign to beasts today. Men were classified with horses and goats in determining the standards of motive power. Failure to perform one's task satisfactorily led directly to the gallows. Except for a few elementary uses of wind and water power, every ounce was derived from living creatures.

As late as 1800 women were hitched to the trucks which hauled coal from mines in England, and within the memory of many persons today the demands of industry placed a premium upon brawn and brute strength. Perhaps these conditions prompted the Scottish poet, Robert Burns, to write "Man's inhumanity to man makes countless thousands mourn."

Advance in One Lifetime

It is my purpose here to survey the revolutions which have taken place in one major industry—the founding of metals. This industry is unique in that nearly all of its strides toward the elimination of manual operations have been made during a single lifetime.

As one who has been identified with the steel casting industry since early manhood, I may be permitted to assess the progress made in this industry. While my closest association has been with steel foundries, I have found it necessary to know the developments in related industries such as the casting of bronze, brass, aluminum, iron and other metals.

An historical sense of these developments grows partly out of my interest in Elizabeth Furnaces at Brickerville, only 11 miles from my home in Lebanon. It was there that William Henry Stiegel made castings for the Franklin stove and shipped the parts to Philadelphia for assembling. From Stiegel's day to the latter half of the nineteenth century, both ferrous and nonferrous foundries were operated along lines which showed little consideration for the employees.

It must be remembered that prior to the Benjamin Franklin stove the only manner of heating a home, or any building, was by open woodfires, and his device for creating and confining heat was the forerunner of the varied heating devices of today, many of which have been made available through the use of castings.

To make any casting there must first be the design, and here creative ability, originality and ingenuity have played a most important part. They have given to the world methods of producing castings by the thousands per day from a given pattern and made possible the many appliances we use today as necessities.

The patternmaker, in turn, has to make the projected design of the engineer come true and also construct his pattern for minimum manual handling in the foundry. The tools used in a modern pattern shop

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are the result of inventive genius to reduce the manual work of the patternmaker and to increase his production.

Many of the designs and shapes requested from the foundry have become extremely complicated; but due to modern machinery these patterns can be made to appreciably greater accuracy than the hand-hewn methods that existed only a few years ago.

Molding and coremaking in the early days of American foundry practice were considered highly skilled arts. Men were required to know and be skilled in many foundry operations that are not now considered within the province of the normal molder's or coremaker's classification. The early-day molders were required to mix, and prepare the sand by hand, tempering with water at their own discretion and cutting it and finally judging by squeezing in the hand, if it felt proper for the mold which was to be made. The judgment of the molder was final and the responsibility of a good casting was his. Today the sand is mixed and tempered by machinery and delivered ready for use to the molder and coremaker.

In the good old days the molder did more than make the mold; he actually poured the metal, he shook the casting from the mold and then prepared his floor for the next day's work. Today the molder is strictly a molder, and his efforts are concentrated on this particular phase of production.

During the early days of steel castings it was considered necessary to dry all molds, but around 1892 a molder in St. Louis, by mistake, poured metal into a green sand mold. When examined it was found to be better than those made in dry sand and thus the green sand method of molding was developed.

The turning point in the development of labor-saving machinery in the foundry was the invention of the first molding machine. In 1879 Frank Reinholds in New Haven, Conn., put on the market a hand presser, which was soon superseded by a stripping machine, invented in 1880. Charles Herman invented the first jolt machine in 1887. Pneumatic molding machines came into use in eastern Pennsylvania in 1908. Today with the many improvements that have taken place, it is possible to make as many as 100 molds of small castings in an eight-hour day.

Prepare Mold for Casting

Coremaking improvements have followed the trends that have been outlined for molding, and the modern foundry supplies finished cores that are ready to be set into the core prints of the mold. Venting for the release of mold gases has been provided on pattern boards as well as the placement of risers for adequate feeding. These steps have been accomplished during the early stages of planning. As soon as the cores are set, the flask in lowered by overhead cranes and the mold may even be clamped with automatic air clamps and is ready for casting.

This operation of casting is usually done at a remote point from the molder's station by an entirely separate crew, assigned to this operation. After the castings have been poured and sufficient time allowed for solidification, they are again conveyed by mechanical means to the shakeout. Here the flask is relieved of the sand, and the casting, after separation from the sand, is conveyed to the cleaning room. The sand returns through an automatic system in which it is reconditioned for salvaging and reuse.

One of the clearest recollections of my youth is watching a group of

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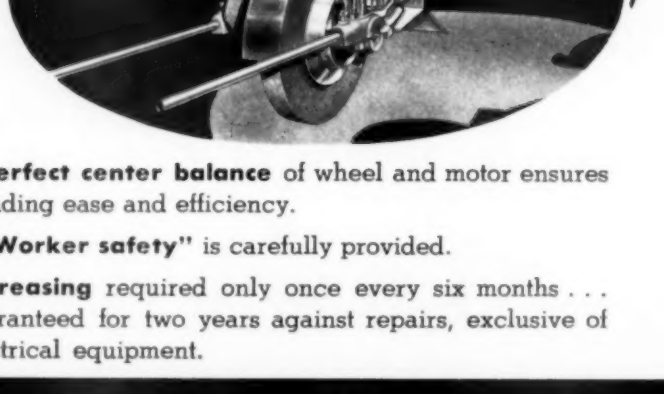

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three laborers in a foundry in Chester. They were notching the base, or neck, of the gates and feeding heads on hot castings which were to become coupler knuckles. One worker held a chisel, the long handle of which was crudely improvised from the limb of a tree. Later, when the casting was cooled and brittle, two other workers broke off the risers and gates by flogging. Then followed an operation which we might call machining, but it was carried on with such simple tools as the planer, shaper, slotter, and even the chisel and sledge. Great strides since have been made in the chipping, trimming and cleaning departments.

The first pneumatic tool was invented by James A. MacCoy who, in 1889, received the John Scott Medal in recognition of his achievement. This medal was awarded upon the recommendation of the Committee on Arts and Sciences of the Franklin Institute.

Employ Torch Flame

Cutting by torch flame, which had its origin at the time of World War I, has eliminated the need for much manual labor. Other forms of oxy-acetylene cutting have been developed so that projections can be cut to very close contours. Gas and electric arc welding of steel and alloys have replaced the need for blacksmithing, forge welding, and other crude methods of repair.

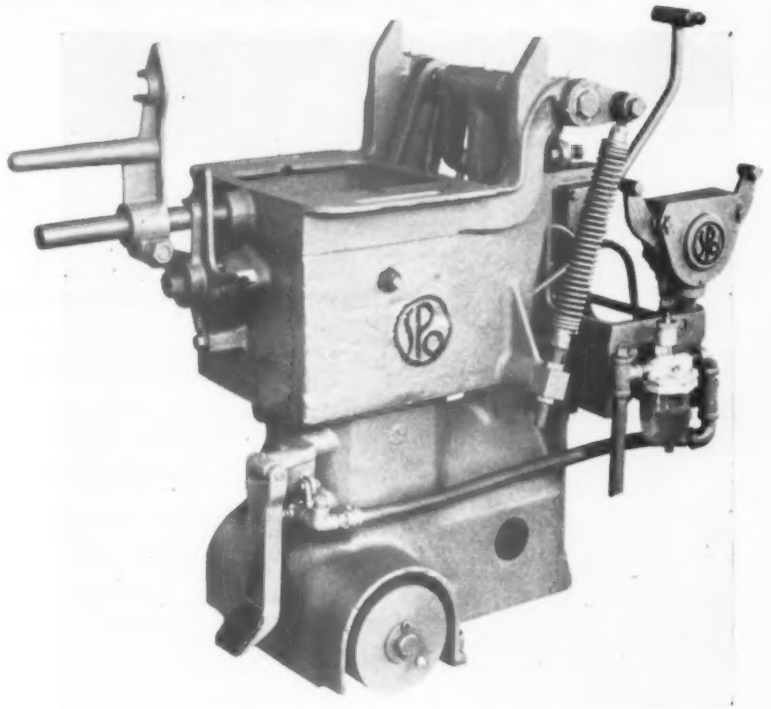
One of the constant problems of the foundry is the removal of sand and scale from the casting. Here again, sand is brought into play. The first sandblasting machine was put on the market in 1872 by Benjamin Tilghman of Philadelphia. The sand was played against the casting through a rubber hose under air pressure, much in the same manner that a garden hose is used to spray the lawn. Later sand was sprayed against castings in a rotating barrel which tumbled the castings as it rotated and exposed all sides to the blast.

The tumbling process was employed before the sandblast was adapted to it. The castings are tumbled with other star-shaped castings which knock against them so that, by impact, sand and scale are dislodged. Today, in addition to normal sandblasting there is the hydroblast, or water method, which has been found very effective.

Heat treatment, once known as annealing while in its simpler forms, is comparatively new in foundry operations. That which was done was largely a matter of guesswork, trial

(*Continued on page* 211)

Do You Want More Accurate Cores?..



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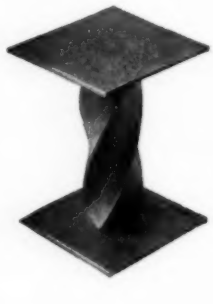

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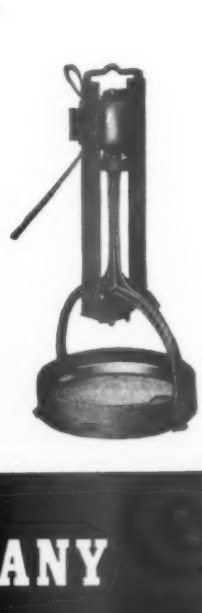

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(*Continued from page* 209)

and error. Today heat treatment of castings, both ferrous and nonferrous, is a closely controlled operation designed to improve the mechanical and physical properties of the castings. Temperatures must be controlled within a very narrow range, and in recent years better furnace installations have been developed for this purpose. Today many furnaces operate with very close uniformity throughout the entire heating chamber. This has had a definite effect upon the uniformity of the physical properties obtained from the product.

The art of heat treatment has, therefore, become a vital part of the foundry industry. A better understanding of the metallurgical features as produced by heat treatment has made it possible to produce castings for many types of specialized services which formerly were considered impossible.

Develop Inspection Methods

In the past, visual examination of castings was the only means that could be employed for investigating product quality. Visual inspection is needed today and cannot be eliminated, but it has its limitations when it comes to the more critical service applications. The eye cannot detect unaided, some of the defects that might cause the casting to fail under service conditions.

Science has supplied us with new methods of inspection. The x-ray is applied to all forms of castings which are made for critical services. This inspection is of value, not only to the consumer or purchaser of the product but to the foundry itself, in establishing founding practice for highest quality castings. Early radiographic examination of castings was first applied only to steel castings, but today it is an accepted method of quality examination of all types of cast products.

It may be that in this atomic age we shall find that radioactive isotopes may replace the use of radium for industrial radiography. It is believed that radiography is only on the threshold of industrial application. A two-million volt x-ray machine has proven its worth for heavy types of work and the betatron, using 20 million volts, has distinct possibilities for commercial radiographic examination.

Magnetic particle testing, known as Magnaflux, is a recognized method for testing castings which have magnetic qualities. This type of inspection reveals only surface blemishes and defects and does not replace, but rather supplements, radiography. Fluorescent inspection, known as Zyglo, is used to inspect the surfaces of castings which do not have magnetic qualities. It has been facetiously referred to as the dermatologist of the metal industry.

The latest nondestructive testing method employs the use of supersonics, and has the ability to disclose defects in heavy sections and determine their approximate location within the piece. Its application to the inspection of castings has been limited since some refinements of the equipment for the process are apparently needed before the application becomes better understood and generally applied to production castings.

To protect the man who pours the liquid metal from sparks and spillage, he is provided with goggles for his eyes, gloves for his hands, and leggings for his legs. Thus fumes, gases and dust which once characterized a foundry are dissipated through exhausts which serve to cleanse the air and moisten the dust so that it becomes a sludge for easy handling and disposal. Some foundries have found it feasible to install air-conditioning, controlling temperature and humidity, and resulting not only in improved working conditions, but also in improving the quality of the product.

Some persons are prone to make statements derogatory to management in the founding industry. To such I make the suggestion that they visit an up-to-date foundry and then know whereof they speak before they assail us. Let them see the rest rooms, dispensaries, lockers and showers. It would profit laymen if they were to visit the foundries set up by the advanced and forward-thinking foundries of the day and see what a transformation has taken place in the last fifty years.

It is relatively simple to illustrate the fact that everyone has lived with castings, perhaps subconsciously, from the moment of his birth. In 1900 output of automobiles was less than 5000 cars, and then began their great mass production. Output of automobiles depended upon the production of their component parts, perhaps the most important being the engine cylinder of cast iron. At this time, three trained young men in the cast iron foundry business formed a company, Campbell, Wyant & Cannon of Muskegon, Mich., to specialize in these castings. They had little money but plenty of know-how and courage. Anticipating the ever-ex-

PURDUE FOUNDRY CONFERENCE

Is Scheduled for Nov. 3-4

SECOND annual Metals Casting Conference, sponsored by Purdue University in co-operation with the Michiana and Central Indiana Chapters of the American Foundrymen's Society, will be held at Lafayette, Ind., Nov. 3 and 4.

A discussion of foundry costs, together with methods of determining costs, and cost reduction, by experts in the field and Purdue staff members, will be an important feature of the two-day program. There will be technical sessions on various aspects of metals casting, and an AFS motion picture on metal flow in molds. Quality control in foundry work will also be discussed.

On Thursday evening, Nov. 3, the annual banquet will be held, with an outstanding speaker on a topic of general interest. Selected student members of the Purdue honorary societies will be guests. The group will visit the sand testing laboratory at Purdue on the final day.

The committee in charge of the program includes Paul H. Harlan, vice president, Electric Steel Castings Co., Indianapolis, chairman of the committee; Prof. H. A. Bolz, head of the General Engineering Department at Purdue; Keith E. Glancy, conference supervisor, Purdue; F. A. Honer, secretary-treasurer, Woodward Pattern Works Inc., South Bend, Ind.; W. F. Lange, vice president, Casting Service Corp., LaPorte, Ind.; Roy W. Lindley, chairman, manufacturing processes laboratory, Purdue; C. T. Marek, associate professor of manufacturing processes, Purdue; V. S. Spears, American Wheelabrator & Equipment Corp., Mishawaka, Ind.; S. F. Swain, assistant secretary-treasurer, Golden Foundry Co., Columbus, Ind.; S. C. Massari, technical director, AFS, Chicago; R. S. Spurgin Jr., foundry superintendent, Swayne-Robinson & Co., Richmond, Ind.; and G. M. Enos, professor of metallurgical engineering, Purdue.

Registration for the group will start at 9 a.m., Nov. 3, in the lobby of the Purdue Memorial Union. Advance reservations should be sent to M. M. McClure, Technical Extension Division, Purdue University, Lafayette, Ind.

panding market for automobiles, they introduced into their foundry, methods and devices unheard of before, and their initiative was quickly followed by others so that you and I and the man who formerly operated the tread mill could ride in luxury in an automobile within the means of all.

I wonder if women appreciate how castings made possible the full fashioned hosiery they wear? In the 1890's two Germans, Henry J. Janssen, a mechanic, and Ferdinand Thun, a bookkeeper, opened a small machine shop in Reading, Pa. From that modest beginning sprang the Wyomissing Industries and in the foundry of one of their companies, the Textile Machine Works, is found the most modern method of making the brass, aluminum and iron castings that enter into the construction of the machines that weave hosiery. The plant is so modern that if it were not for the molten metal one would hardly know he was in a foundry.

You have been annoyed when driving your car by being held up by a giant truck or bus ahead of you. Into that truck or bus have gone a myriad of castings of gray iron, malleable iron, brass, aluminum, and steel, and neither the truck nor bus would have been possible without these castings.

Let us turn to the home for a moment. As you unlock your door, do you realize that millions of keys for this purpose are made of malleable iron, weighing about an ounce apiece. As you enter the kitchen you find castings in ranges, stoves, refrigerators, and incinerator. Enter your bathroom and you find the tub and shower, the lavatory, the faucets, all castings using iron or brass. Many bowls and vases cast of silver or other metals grace your dining room table. How could a modern home be conducted without castings?

A famous engineer of a century ago and a member of the board of managers of the Franklin Institute, Joseph Harrison Jr., published an account of the rabbinical legend of the Iron Worker and King Solomon. The volume contains a reproduction of a painting, made for Mr. Harrison, in which a blacksmith is shown seated on the throne to the right of King Solomon. The people are gathered around the throne to protest that a mere ironworker had no right to such a distinction.

According to the legend Solomon silenced the protests in the following manner: Turning to the stone carvers the King asked: "Who made the tools with which you carve?"

"The blacksmith," they replied.

Then to the woodworkers: "Who made the tools with which you hewed the trees of Lebanon and formed them into pillars and roof for the Temple?"

"The blacksmith."

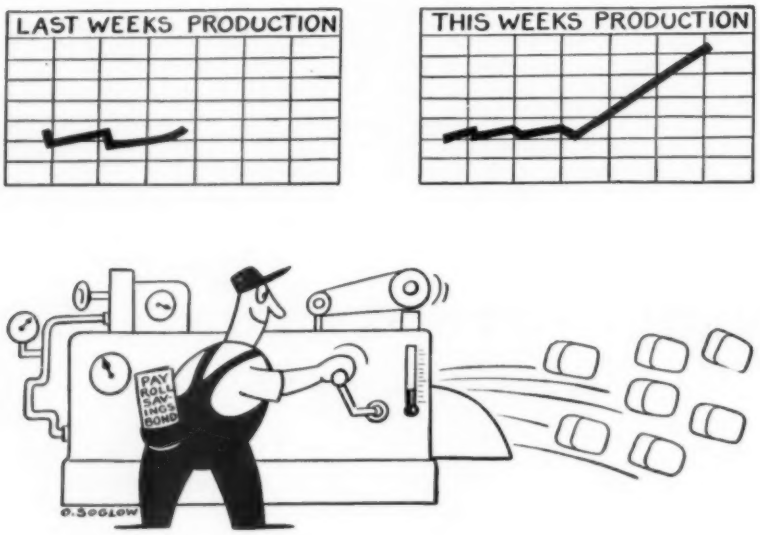
Then to the artificers in gold and silver: "Who made your instruments?"

"The blacksmith."

Then Solomon turned to the blacksmith saying: "Thou art all men's father in art. Go wash the sweat of the forge from thy face and sit at my right hand. The Chiefs of my workmen are but Men; thou art more."

I am sure that today Solomon, in his wisdom, would extend that honor to the foundryman.

"Supervisory Training: Case Studies," is the title of a new report published by Policyholders Service Bureau, Metropolitan Life Insurance Co., One Madison Ave., New York 10. Ten executives in original signed articles outline their own or their companies' experiences with training programs.



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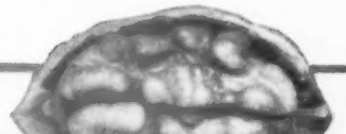

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Nonferrous Foundry Is Clean, Light and Well Planned

(*Continued from page* 83)

2 x 10-in. sections about 10 ft long, which are bolted together in a pattern resembling a huge web. Stringers, running the length of the building, are placed on top of the structural members and gypsum asbestos board is used for the cover. The roof is self-supporting and is said to be as strong and rigid as a roof constructed of steel.

One of the features claimed for the roof is that a damaged or burned-out section of it can be removed and replaced with new members without the necessity of replacing the entire roof. Furthermore, it requires no supporting pillars which break up floor space in the building. It has been used extensively in new construction on the West Coast and recently has been incorporated in a number of buildings in St. Louis.

Ninety per cent of the company's work is the production of brass and bronze castings, with the remaining 10 per cent in miscellaneous aluminum castings. Alloys used are 85-5-5-5 and 88-10-2 for brass and bronze and 95 Al, 5 Si, and 95 Al, 3 Si, 2 Cu for aluminum work.

A majority of the company's business consists of brass and bronze castings for the electrical trade. Included among the items made are electric transformer parts, hot line clamps and electrical tools. Some ornamental work for the construction industry also is done, and at the time of this writing a bronze dedication placque which was to be mounted on a building, was being cast. The company also makes bronze dies to be used in pressing papier-mache sun helmets and tray bases for silverware chests.

The foundry is laid out on a straight line production plan. The receiving door opens through the side of the building near the back and can be seen at extreme right in Fig. 1. It is an overhead sliding door which takes up no floor space.

Metal Melted in Crucibles

Four oil-fired crucible furnaces, three of which are shown in Fig. 4, are used for melting metal. Each furnace holds a No. 60 crucible with a capacity of approximately 200 lb of brass or 60 to 70 lb of aluminum. Two centrifugal type blowers supply the draft for the four furnaces. Furnace hoods were designed by Mr. O'Hare and are effective in removing heat, smoke and fumes. They are pyramidal-shaped metal structures, measuring about 4 ft wide and 3 ft deep at the base, mounted on small wheels which run on tracks at the sides of each furnace. Openings at the top of the hoods are not fastened to the duct work which leads to a horizontal collector pipe about 10 ft above the floor and is connected at one end to a stack which carries off fumes and heat. Bottoms of the ducts leading to the individual furnaces are sloped upward toward the back of the furnaces to permit easy alignment with the opening at the top of the hoods as they are rolled over the furnace during melting operations or behind them when the crucibles are being removed or the furnaces charged. Small openings in the front of the hoods permit observation of the furnace during the melting period.

Machine molding and coremaking operations are located along the left of the aisle leading from the furnace area to the front of the

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building. The molding department (Fig. 5) is equipped with six jolt-squeeze molding machines, and the operator of each machine turns out an average of 100 molds per day. Various sizes of flasks are used for molding operations. Eighty per cent of the work is cast in 12 x 18-in. steel flasks, with cope and drag sections each 3 in. deep. The wide variety of patterns in a nonferrous job foundry requires numerous other sizes of steel, snap and floor flasks. Magnesium bottom boards are used with the smaller sizes and wooden bottom boards for the larger sizes. Asbestos composition boards about 1½-in. thick are placed on top of the molds during pouring.

Three electric-motor-driven gyratory riddles with ¼-in. screen are used for reconditioning molding sand. Two of these riddles are located in the machine molding area and the other in the floor molding area. Each of the riddles is suspended from an overhead monorail which permits its movement to service each of the operators. Fig. 3 offers a close-up view of one of the riddles. Tennessee sand with the following characteristics is used for most molding operations. Permeability, 15; green compression strength, 8.3; average fineness, 129; clay content, 17.2 per cent, and moisture, 8 per cent.

Hoists Are Movable

Two hand-operated hoists, each mounted on a tramrail system suspended over the molding areas and cleaning section, are used to lift and transport crucibles of molten metal to the molds for pouring and for moving large containers of castings and scrap to and from the cleaning department.

Coremaking operations are centered in an area at the end of the machine molding department near the front of the building, and are shown in Fig. 2. Equipment consists of two core blowing machines, two gas-fired core ovens, a core bench, and a vibratory core drawer for removing green cores from coreboxes. Most of the cores used in this foundry are made from a Missouri white sand of 85 mesh. The core sand mix is as follows: 175 lb sand, 4 cups dextrine, 8 cups linseed-oil-base core oil, 2 cups No. 1 fuel oil, 4 cups southern bentonite and 3 pints of water. Cores are baked at approximately 450° F for varying lengths of time depending upon the size of the cores. The oven shown in the illustration was designed and built by Mr. O'Hare for use in his original foundry.

On the other side of the building, from the furnace area forward, are located the floor and bench molding area, cleaning and burnishing department, and the inspection bench. To the right of the inspection bench is the door leading to the shipping platform. A view of that area is provided in Fig. 3.

The cleaning department is equipped with a No. 1 sprue shearing machine; a 14-in. flexible abrasive wheel cutoff machine; a band saw; a No. 4 sand blast barrel; a 24 x 36-in. cabinet type sand blast unit; a rubber-lined water barrel machine, which operates at 12 rpm, for final burnishing of brass and bronze castings, and three bench grinders. Speeds of the grinding machines are so regulated that a 14-in. wheel may be used on one machine, then shifted to the second machine when the wheel diameter is reduced to 10 in., and shifted again to the third machine when the wheel diameter reaches 8 in.

The Magnesium Association has moved its offices to 307 Chanin Bldg., 122 East 42nd St., New York 17.

HERE'S WHAT OTHER FOUNDRYMEN SAY ABOUT BUCKEYE SILICA FIRESTONE

- "I have been in the foundry business a little over twenty years and we have never bought a product that met with such instantaneous approval, not only from the superintendent and foremen, but from the workmen themselves around the cupola."
  —*Foundry in Georgia*
- "Well satisfied with the trial of Buckeye Silica Firestone. Use 83% steel and any material which stands our heats has to be good."
  —*Foundry in Illinois*
- "Run 77% steel. Buckeye Firestone twice as good . . ."
  —*Foundry in West Virginia*
- "After 145-ton heat in eight hours, man and helper can reline in 12-man hours, including wheeling in stone and clay, and mixing. Same job for ------- would take 24 hours.
  —*Foundry in Ohio*
- "We have used Buckeye Silica Firestone for several years as a cupola lining in the melting zone and find it very efficient and economical."
  —*Foundry in Michigan*
- "Buckeye Silica Firestone very satisfactory. Lasts three to five times as long . . ."
  —*Foundry in Alabama*

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NEW Equipment AND SUPPLIES

For Additional Information on these Items Use Reply Card—Page 219

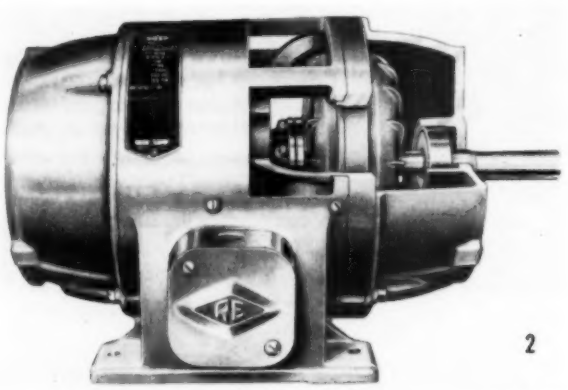
(1)—Crane Cab: Northern Engineering Works, 2615 Atwater St., Detroit 7—Crane control cab provides operator with almost 100 per cent clear vision in any direction at all times. This type of cab can be used only when all crane motions are governed by full magnetic control with operation by special master switches. The two upper master switches shown in the illustration control the hoist and trolley motions, respectively. Bridge travel motion is controlled by foot-operated master switch. The hydraulic bridge brake is controlled by the operator's other foot. These controls may be operated from either a sitting or standing position. Cabs may be enclosed in glass where conditions require. The cranes are designed in capacities up to 100 tons, in spans to suit requirements.

For More Details Circle No. 1—Page 219

1

(2)—Fluid-Shaft Motors: Reuland Electric Co., 3001 West Mission Rd., Alhambra, Calif.—New motors feature a single frame, integral design of motor and fluid drive coupling and are said to offer advantages wherever loads require smooth acceleration, protection from "jamming" and shocks, or are difficult to start. Because the motor is practically up to speed before any load is applied, it is possible to use motors which can be selected closer to actual horsepower requirements. The motors are available in ½, ¾, 1, 1½, 2, 3, 5, 7½ and 10 hp units. Motor reducers are available in either single or double reduction types.

For More Details Circle No. 2—Page 219



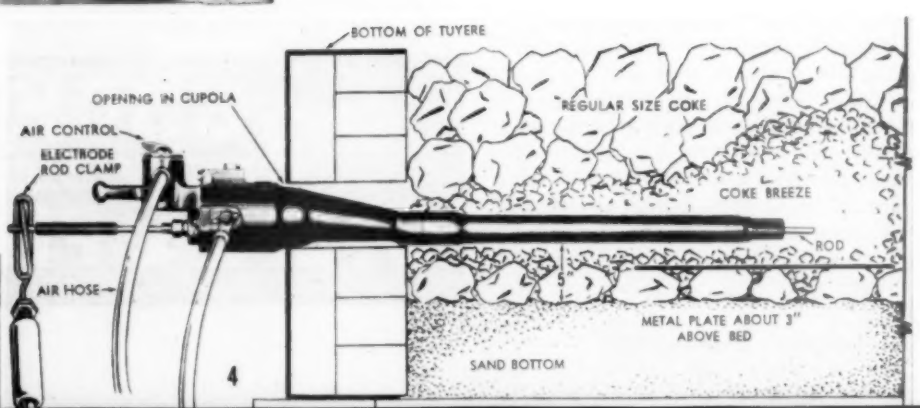
2

(3)—Core Extruder: Wadsworth Equipment Co., Box 1351, Akron 11, O.—Stock core extruding machine has been designed for high-speed extrusion of round, square, hexagonal and any special shape stock cores. It will make uniform cores from ¼ to 3-in. in diam, vented or solid, with special pilots for square or triangular vent holes for rodded cores. Production rate, depending on core size and viscosity of core mix, varies from 280 to 500 ft per hr. Entire unit is fully enclosed, all moving parts are mounted in double-sealed, permanently lubricated ball bearings. Drive from ½-hp gearmotor is direct to conveyor screw through helical spiral steel miter gears. New sand impeller in top of hopper controls rate of sand flow and insures constant feed for uniformity of extruded cores.

For More Details Circle No. 3—Page 219

(4)—Coke Igniter: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Electric coke igniter eliminates use of wood, gas or oil for burning in the cupola coke bed, and it is said to prevent the offensive smoke and odors usually caused during this period of operation. It is inexpensive to operate, using only compressed air and one welding rod for each light.

3



4

Only 15 to 25 seconds of power are required from either a small transformer or a welding machine, it is claimed. Unit is 45 in. long, has a 1¾-in. barrel and weighs 22 lb. It should be operated about 5 in. above the sand bottom through the breast of the cupola, or through a special opening in the side or back of the cupola. In operation, the coke bed is grounded by the metal barrel of the igniter. An arc is struck within the coke bed by passing an electrode through an insulated tube within the igniter barrel. Sufficient air for rapid combustion is furnished. About 20 seconds after the arc is struck, the vibrator tube containing the electrode holder is withdrawn, and a booster blast pipe inserted.

For More Details Circle No. 4—Page 219

Drive Belts: United States Rubber Co., Rockefeller Center, New York 20—Round, endless belts for small machinery applications are made without a splice. Cord pulling members are designed to keep stretch at a minimum and bias cut jackets protect the inner structure and insure flexibility. They are offered in sizes from 3/16 to ½-in. belt diameter and from 6⅞ to 156⅜ in. inside circumference.

For More Details Circle No. 5—Page 219

Band Saw: Walker-Turner Division, Kearney & Trecker Corp., 639 South Ave., Plainfield, N. J.—Twelve-inch band saw has frame and body of three-piece cast iron design. The following features are claimed: Adjustable cushion tensioner to protect blade from shocks, complete guarding, with steel wheel and blade covers, and guides with split-leaf blocks set at 45 degrees to secure maximum support close to work, with low friction loss and consequent long blade life. Saw capacity is: Blade to frame, 12 in., and guide to table, 7 in. maximum. Rip fence, mitre gage, stand, motor, and other attachments can be furnished.

For More Details Circle No. 6—Page 219

Paint Sprayer: Binks Mfg. Co., 3122 Carroll Ave., Chicago 12—Portable paint spray unit weighs 47 lb and is designed to handle enamels, lacquers, house and barn paint, shellacs, varnishes, and other coatings. It delivers 40 lb working pressure in ample volume to operate the company's standard spray guns, it is claimed. It plugs into a 110-120 v ac line. The compressor is 15⅞-in. long, 11½-in. high and 7½-in. wide at the base. There are no exposed moving parts; the motor has a safety cut-out overload switch, and oversize cooling fins on the compressor aid continuously cool operation.

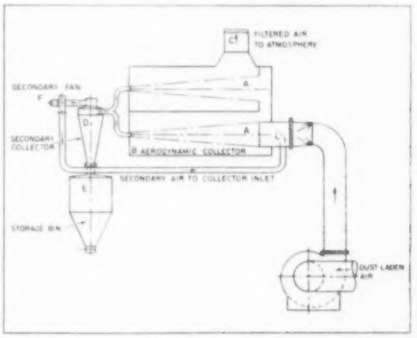
For More Details Circle No. 7—Page 219

Drum Sander: American Diamond Saw Co., 519 Northwest Park Ave., Portland 9, Oreg.—New type buffer drum uses abrasives in strip

form. It is a split drum, cushioned with rubber, the halves of the drum being locked into a solid drum by a cone type washer. Standard width abrasives in various grits, available in roll form, are wrapped around the drum and secured into place by pins that recede out of the way when the cone washer is tightened down. Unit is available, rubber cushioned, in sizes from 6¼ to 12 in. diam and various standard widths and bores. A 6¼-in. felt cushioned sander also is available.

For More Details Circle No. 8—Page 219

Dust Collector: Aerodyne Development Corp., 901 Leader Bldg., Cleveland 14—Dust collector, designed for efficient operation on large installations, is said to have high resistance to erosion by abrasive dusts and grits. Heart of the system is a slotted cone of sheet steel, shown at *A* in the diagram. Air or gas to be cleaned enters the cone and passes over the slotted area at high velocity. The slots set up aerodynamic forces that cause the filter action. Dust particles are suspended in the form of a thin cloud in front of the slotted surface; cleaned air escapes through the slots and is exhausted from the system through opening *C*. It is claimed there is little chance for the filter to become clogged. Dust is



drawn by fan *F* into a secondary collector *D* from which it is deposited in bin *E*. Dust not collected in the secondary collector is carried back to filter inlet to pass through the system again. Filter cone is readily accessible. Cones may be fixed in a horizontal, vertical or inverted position without hindering filter action. The unit may be applied to cupolas to filter discharge gases.

For More Details Circle No. 9—Page 219

Cartridge Heater: Trent Inc., 5003 Wilde St., Philadelphia 27—Cartridge heater features pigtails of nickel-clad stranded copper wire covered with a silicon-impregnated glass sleeving. Pigtails are locked in the heater head by a hard cement seal and the opposite end of the unit is brazed on. Improved construction also includes new multiple-pass porcelain core which locates heating coil in relation to metal shell and provides greater space for heating element wire.

For More Details Circle No. 10—Page 219

Nodulizing Alloy: Electro Metallurgical Division, Union Carbide & Carbon Corp., 30 East 42nd St., New York 17. New magnesium-ferrosilicon alloy promotes the formation of nodular graphite in gray iron. Containing about 7 to 10 per cent magnesium, approximately 43 per cent silicon and the balance chiefly iron, it is available in a standard size of ⅜-in. and smaller. Since the alloy acts both as a nodulizing and an inoculating agent, often only one ladle addition is said to be required

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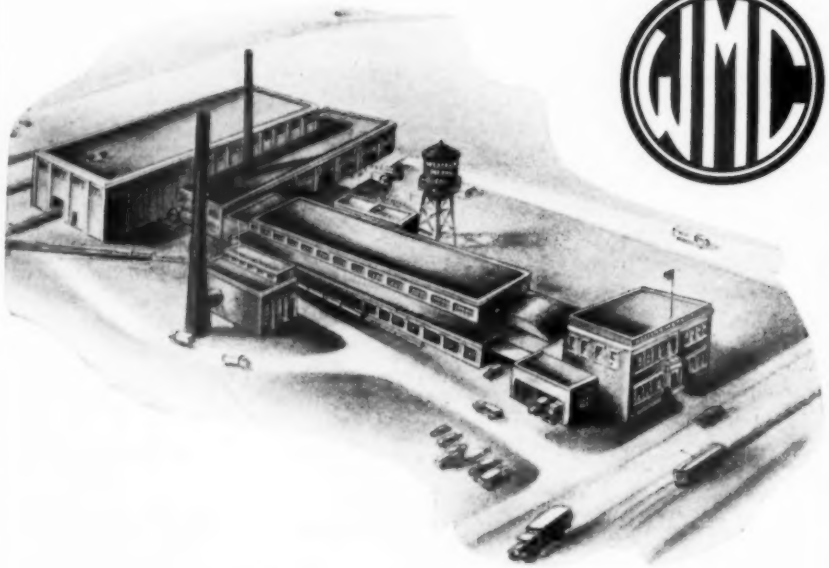

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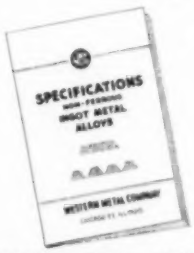

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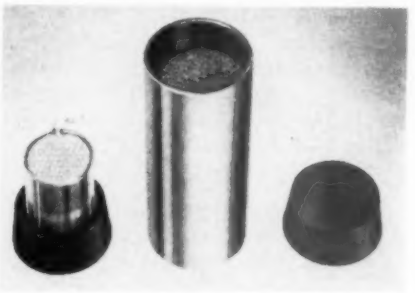
for the production of nodular graphite iron castings. Magnesium recoveries are reported to be comparatively high. (Editor's Note: For further discussion of this type of nodulizing alloy, see p. 72).

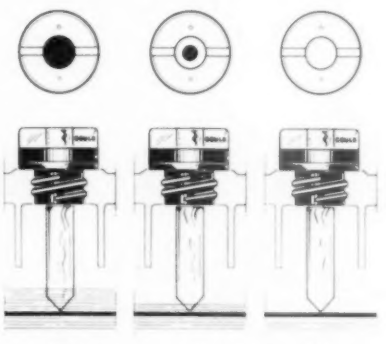
For More Details Circle No. 11—Page 219

Sand Control: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Equipment for a quick, simple check test for the permeability meter consists of a tube which contains an actual permanent sand standard which may be used with the orifice or stopwatch as desired. It is said that the check reading may be taken as rapidly as with a routine sample. Four ranges (25, 50, 100 and 150) of permeability are available, the exact value being stamped on each tube. A self-contained desiccator insures that the calibration will remain constant indefinitely.



For More Details Circle No. 12—Page 219

Battery Vent Plug: Gould Storage Battery Corp., 467 Calhoun St., Trenton 7, N. J.—Translucent plastic vent plug is designed to show at a glance whether a battery needs water. The plug has a cylindrical element which projects down into the electrolyte; the portion of the element which extends into the electrolyte is cone shaped. When the electrolyte is at the correct level, the cone is covered completely. Light waves traveling down the element are absorbed into the electrolyte and not reflected. The top of the plug shows a black circle, indicating that no water is required. When the



(*Continued on page* 222)

HELPFUL LITERATURE

95. Sand Rammers

Cleco Div, Reed Roller Bit Co.—8-page illustrated bulletin No. 76B contains design and application data on air operated sand rammers for floor, flask, bench and core work. Also described briefly are pneumatic tools such as chippers, scalers, hammers, drills and grinders. Data are given on handle bushings, screen bushings, air hose couplings and pressure-seated air valves.

96. Diecasting Machine

Cleveland Automatic Machine Co.—4-page illustrated bulletin 200 is descriptive of model 200 universal high pressure hydraulic diecasting machine for aluminum, magnesium or brass. Simple change of hot metal end equips machine for casting zinc, tin or lead. Model has estimated locking pressure of 200 tons, 27-inch square die plates and maximum die space of 19 inches.

97. Hardness Tester

Teleweld, Inc.—Illustrated folder "The Telebrineller" deals with simple instrument which makes it possible to determine Brinell hardness of metals quickly anywhere, without dismantling and without transporting specimens to laboratory.

98. Grinding Equipment

Chicago Wheel & Mfg. Co.—64-page illustrated booklet No. F 980 presents information on mounted wheels, electric grinders, drill press, steel cutters, saws, polishing wheels, mandrels, brushes, drum sanders and abrasive bands.

99. Ferro-Alloys & Metals

Electro Metallurgical Co.—100-page illustrated booklet "Electromet Ferro-Alloys & Metals" presents properties, analyses, grades, sizes and other information on chromium, manganese, silicon, vanadium, tungsten, zirconium, columbium, boron, calcium, titanium and their alloys.

100. Centrifugal Blowers

Stroman Furnace & Engineering Co.—4-page illustrated bulletin No. 300 features centrifugal blowers made in any size to deliver even flow of air at constant pressure over entire range of delivery volume. Also discussed are combination blower and oil pump units. Full specifications are given.

101. Finishing Materials

Tousey Varnish Co.—42-page illustrated brochure is entitled "65 Years of Achievement." It tells how company originated and has developed in manufacture of varnish, enamel, lacquer, synthetics and other types of finishes. Production processes and facilities are described in detail as is industrial department for developing special products to meet specific service conditions.

102. Mixers & Blenders

H. W. North Co.—4-page illustrated bulletin HB-1 deals with horizontal mixing and processing machines equipped with various combinations of multiple ribbon or paddle type agitators turning on antifriction bearings mounted and sealed separately from trough end walls.

103. Molybdenum Steel

Climax Molybdenum Co.—72-page illustrated booklet "Three Keys to Satisfaction" discusses importance of good design, selection of proper steel and various operations which must be performed on steel in order to produce finished parts. Numerous data, charts and drawings are useful to those concerned with designing and producing heat treated alloy steel products.

104. Midget Mills

Severance Tool Industries Inc.—32-page illustrated catalog No. 17 covers midget mills, deburring cutters, tube mills and cutters, countersinks and reamers and miscellaneous mills, cutters and files. Tooling manual presents uses of various tools described as well as other pertinent information.

105. Protective Clothing

Asbestos Products Co.—4-page illustrated folder "Asbestos Heat Protection" shows and describes asbestos reversible mittens, long-wearing gloves and other items. Inserted leaflet depicts chrome leather pads and mittens and asbestos or chrome leather aprons and sleeves.

ADDITIONAL INFORMATION?

For additional information on any of the items described under "New Equipment and Supplies", "Trade Publications" or "Helpful Literature" in this issue — simply circle their corresponding item numbers on one of these cards.

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106. Abrasive Wheel

Simonds Abrasive Co.—4-page illustrated folder "Fibrex Red Wheel" presents information on aluminum oxide abrasive wheels available in depressed center type for portable machines and as straight wheels for cutoff machines and general purpose use.

107. Power Wheelbarrow

Bell Aircraft Corp.—8-page illustrated brochure "The Bell Prime-Mover" describes high-capacity mechanically dumping wheelbarrow, mounted on power-driven three-wheel chassis and steered by means of rear caster wheel. This gasoline engine driven unit will carry any wet or dry material, even on heavy grades.

108. Alloy Steel Chain

S. C. Taylor Chain Co.—12-page illustrated bulletin "TM Alloy Steel Chain—More Safety Than Meets the Eye" contains specifications on sizes ¼ through 1¾-inch diameter chain; working load limits; definitions and cautions; recommended use; and details of chain service for alloy steel chains, sling chains and attachments.

109. Materials Handling

Barrett-Cravens Co.—4-page illustrated bulletin No. 4881 presents various materials handling equipment which supplement basic line of lift trucks, elevators and storage racks.

110. Air Conditioned Cabs

Dravo Corp. — 12-page illustrated bulletin No. 1300 describes air conditioning systems for crane cabs operating in hot or contaminated atmospheres. Various requirements are listed, and mechanical as well as functional features of cab cooling equipment are explained. Specification sheets for three different models are included.

111. Oil Burners

Hauck Mfg. Co.—8-page illustrated catalog No. 409 explains how series B low pressure air atomizing oil burners can be applied in metallurgical, ceramic, glass, chemical, asphalt and other heat processing industries. Various data, engineering specifications and operating principles are listed also.

112. Industrial Mixers

Worthington Pump & Machinery Corp.—4-page illustrated bulletin R-504 contains descriptions of open or dust sealed mixers for glass, refractory cements, chemicals and enamel frits. Features and capacities of each type are given.

113. Refractories

Quigley Co. — Illustrated bulletins Nos. HC-103T, KY27-30 and CX-201C describe Kyram 27 and 30 ramming mixtures, Hearth-Crete chrome magnesite castable refractory and Chromix ramming chrome mixture.

114. Dust Collector

Aerodyne Development Corp.—4-page illustrated bulletin "Aerodyne, The Aerodynamic Filter" and insert describe dust collector in which filter surface consists of specially slotted sheet bent into form of cone. Unit provides high dust collecting efficiency, practically complete absence of erosion on filter surface, low resistance, and high capacity with space economy.

115. Core Blower

Redford Iron & Equipment Co.—2-page illustrated leaflet gives details of No. 2 stationary magazine type core blower. Handling cores up to 5 pounds, unit has large sand supply hopper and built-in air volume tank. It is quickly adjusted for different height core boxes. Quick-change magazine heads and adapter for sand cartridges are also described.

116. Flasks & Accessories

Black, Sivalls & Bryson, Inc.—96-page illustrated brochure is comprehensive foundry flask catalog and price list. Various styles of foundry flasks, bottom boards, core and squeeze plates, flat band upsets and miscellaneous loose castings and accessories are presented. Also contained in this indexed loose-leaf catalog are ordering directions, construction features and pincenter chart as well as flask and machining prices.

117. Separators & Detectors

Eriez Mfg. Co.—12-page illustrated catalog No. 14 presents data on line of permanent nonelectric magnetic separators and electronic metal detectors. Specifications regarding weights, sizes and strength comparisons for various chute and spout magnets are given as well as tables of operating capacities.

118. Lawn & Industrial Sweepers

Parker Pattern & Foundry Co.—2-page illustrated catalog "Parker-Springfield the Original Name in Lawn Sweepers" lists various types of lawn and industrial sweepers. These sweepers can be obtained in push or pull type as well as in self-powered models.

119. Blast Cleaning Machines

American Wheelabrator & Equipment Corp. — Illustrated bulletins Nos. 114-A and 124-A describe 36 x 42-inch, 11½-cubic foot and 48 x 42-inch, 17½-cubic foot capacity Tumblast blast cleaning machines, respectively.

120. Mobile Crane

Silent Hoist & Crane Co.—6-page illustrated bulletin 89 explains how Krane Kar mobile crane reduces materials handling costs in metalworking and metal producing industries. Four models are available with capacities of 1½, 2½, 5 and 10 tons.

1	21	41	61	81	101
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5	25	45	65	85	105
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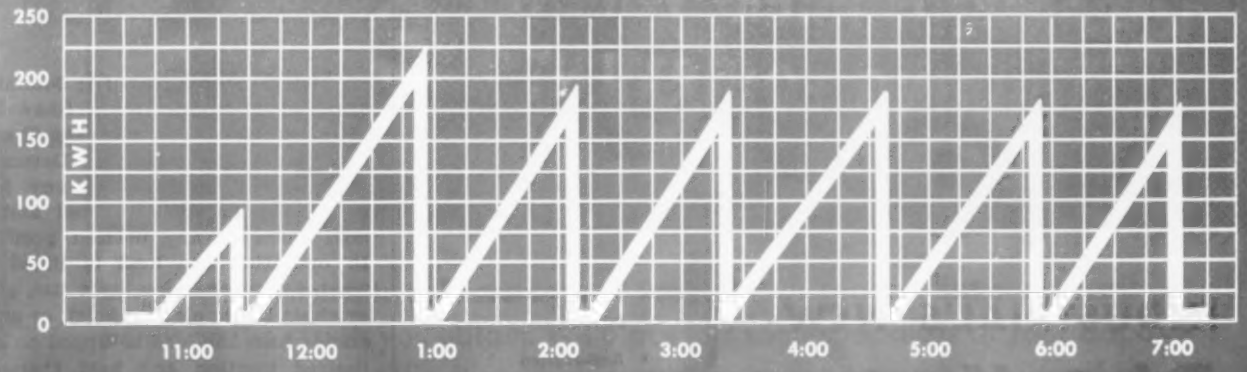
DETROIT ROCKING ELECTRIC FURNACE



One month's operation of type LFY, 175 KW, 700 lb. nominal cold charge capacity Detroit Rocking Electric Furnace. High strength, alloy automotive irons poured at 2800-3000° F.

• No. heats per day—7 • Av. heat weight—1000 lbs. • Total lbs. cold melted—168,930 • Av. power consumption, including preheat—549 KWH/ton • Av. power cost @ 1¼c/KWH—$6.86 • Av. electrode consumption—4.15 lbs./ton • Av. Electrode cost @ 22c/lb.—$.913/ton • Av. no. heats/lining—253 (9-month average) • Av. refractory cost—$3.64/ton.

NOTE: *Operator handles two such furnaces all day. Furnaces are equipped with automatic electrode control as well as automatic rocking control.*

FASTER, CHEAPER, BETTER MELTS IN SINGLE or MULTIPLE OPERATION

Detroit Rocking Electric Furnaces achieve increased production at reduced costs, with rigid control over quality.

The above operating graph of a type LFY, 175 KW, 700 lb. nominal cold charge capacity Detroit Rocking Electric Furnace melting high strength alloy automotive irons is typical of one day's economical operation. Multiply this day's savings by the working days of the year and you realize the owner's great savings.

Besides optimum power use, all-electric operation precludes handling and storing messy, bulky fuels. Equally advantageous is the positive control of operational speed, composition quality and other melting factors. Out-of-production time due to burned-out linings is minimal. Spare, previously-lined furnace shells are quickly, easily installed.

Other saving features are fast, uniform outputs; lowest metal loss by shrinkage; conversion of shop borings and turnings with least loss from oxidation. The arc is automatically established clear of the molten bath at all times. The metal is never a part of the electrical circuit, assuring uniform temperatures within the melting chamber.

Detroit Rocking Electric Furnaces are available in 10 to 4000 lb. capacities with either conical or cylindrical chambers. Individually designed to meet your plant electrical specifications.

Whether you melt ferrous or non-ferrous metals, send us your production data. Our engineers will furnish you facts on how you gain ultimate operating economy with positive melt-quality control, using the Detroit Rocking Electric Furnace suited to your requirements in size, capacity and use. Address:

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC CO. • BAY CITY, MICHIGAN

Foreign Representatives: In Brazil—Equipamentos Industrias "Elex" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi, Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Casco S. de R. L., Atenas 32, Despacho 14, Mexico City, D.F.

Announcing an

IMPORTANT IMPROVEMENT in POURING EQUIPMENT

INDUSTRIAL'S NEW *Distributor*

Distributes Molten Metal

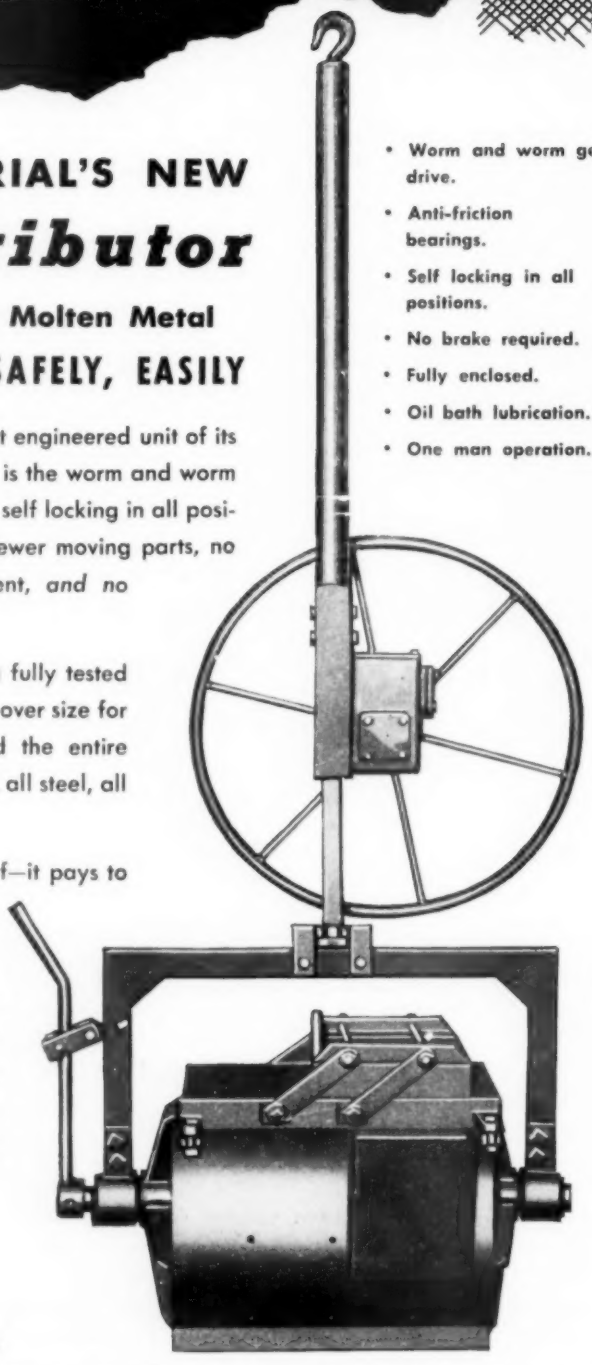
QUICKLY, SAFELY, EASILY

Here it is—the finest engineered unit of its type. Key feature is the worm and worm gear drive which is self locking in all positions. There are fewer moving parts, no need for adjustment, *and no brake!*

The *Distributor* is a fully tested unit. All parts are over size for extra strength and the entire assembly is a rigid, all steel, all welded unit.

Here again is proof—it pays to buy *Industrial*.

- Worm and worm gear drive.
- Anti-friction bearings.
- Self locking in all positions.
- No brake required.
- Fully enclosed.
- Oil bath lubrication.
- One man operation.



SIZES:

The Industrial *Distributor* is available in 700# and 1500# capacities. 2, 2½, and 3 ft. lifts available in each size.

★ Write for Descriptive Bulletin

Industrial EQUIPMENT COMPANY

115 N. OHIO ST. MINSTER 2, OHIO

(*Continued from page* 218)

electrolyte is low, the cone is not covered and light waves are reflected back up the element from the electrolyte surface. A white circle appears, indicating that water is needed.

For More Details Circle No. 13—Page 219

Hoist Attachment: Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Division, 414 Broadway, Muskegon, Mich. — Device is designed to tip loads of any kind after they have been lifted and to hold them in any desired position. In operation the load is lifted by whatever means already in use, either chain block, electric hoist, or small crane; then the load is tipped to any desired position and held there by

turning with a wrench the self-locking worm which actuates a pocket wheel similar to that in a chain block. The device has a capacity of 2000 lb.

For More Details Circle No. 14—Page 219

Take-up Unit: Dodge Mfg. Corp., 1938 William St., Mishawaka, Ind.—Ball bearing take-up unit consists of a deep groove precision bearing with large balls and retainer to minimize wear enclosed in a rugged outer housing with wide milled slots or ways on each end for supporting guides. Housing has a hole for receiving the unthreaded end of an adjusting screw. The unit is suitable for conveyor and power transmission service where provision must be made for changes in shaft position.

For More Details Circle No. 15—Page 219

Handpiece Couplings: Wyzenbeek & Staff Inc., 834 West Hubbard St., Chicago 22—Quick change coupling for flexible shaft machines permits snapping on or off various

(*Continued on page* 224)

SANDS

We are in business to sell tonnages of sand and we realize that our success depends on the results you obtain. We place our sand specialists at your disposal to help you correct difficulties which may have arisen through the use of sands not suited to your particular requirements. We specialize in semi-synthetic and synthetic sands for core room and molding practice and are able to supply you with the proper sand for your needs.

AMERICAN SILICA SANDS

The American Silica Sand Company has served the foundry industry exclusively for thirty years and production at our Ottawa district pits enables us to give you prompt delivery *at any time.*

We invite your attention to the accompanying coupon. There is no obligation on your part. Give us the opportunity to cooperate with you on your sand problems.

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INDEPENDENT FOUNDRY SUPPLY CO.,
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THE FOUNDRY SUPPLY CO., INC.,
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Phone: Geneva 6337

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3612 Clinton Drive, Houston, Texas.
Phone: Capital 1697

FOUNDERS SUPPLIES, INC.,
1074 Ellicott Square Bldg., Buffalo 3, N. Y.
Phone: Cleveland 4937

THE AMERICAN SILICA SAND COMPANY
Atten.: Fred G. Kramer, Technical Advisor,
Central Life Bldg., Ottawa, Illinois.
We would like information on:

- ☐ Having Engineer call
- ☐ Synthetic Sands
- ☐ Semi Synthetic Sands
- ☐ Molding Sands
- ☐ Core Sands
- ☐ Price Quotation

Name ..... Title .....

Company ..... Address .....

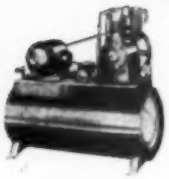
THE AMERICAN SILICA SAND COMPANY

Producers of Dried and Crude Silica Sands

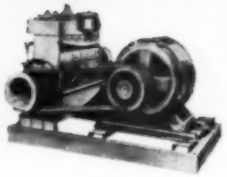
OTTAWA, ILLINOIS

CHOOSE THE COMBINATION SUITABLE FOR THE JOB!

There's a Schramm Size for every Requirement

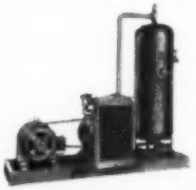


SMALL INDUSTRIAL COMPRESSORS... from ¾ to 5 H.P. single or two stage with horizontal or vertical tanks, working pressures, single stage up to 150 pounds and two stage up to 200 pounds pressure.



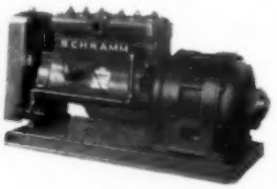
"V" BELT DRIVE ON BASE WITH MOTOR ... this type assembly has proved very popular because it permits the use of the most advantageous operating speeds where only odd frequencies and voltages are available.

MODEL 50 "BUILT-IN" MOTOR DRIVE... the overhead tank unit is only one of the many models and combinations of this small compact industrial compressor that can be bolted direct to any substantial floor.

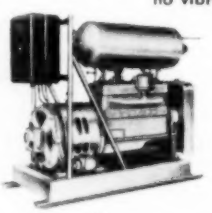


COMPLETE WITH VERTICAL TANK AND COOLING UNIT... a package that simplifies installation. Compressor is mounted complete with motor, vertical tank and cooling unit on base that can be bolted to any solid foundation.

HEAVY DUTY "V" BELT DRIVE... built in sizes ranging from 157 to 609 cubic feet displacement, suitable for service twenty-four hours per day with the lowest up-keep and operating costs.



DIRECT MOTOR DRIVE WITH COOLING UNIT... the built-in type utilizes to the fullest extent the efficiency of motor and compressor. No external flywheels or pulleys, no vibration and no bolts to adjust.



OVERHEAD TANK, STARTER AND COOLING UNIT... the advantages of this type of installation are, the absence of any external parts, no belts to be maintained, or to be replaced when worn out, small floor space required. This unit is practically vibrationless in operation, and can be placed and operated on any floor of sufficient strength to carry the load, no foundation is required.

WRITE FOR BULLETIN 4910

SCHRAMM INC.

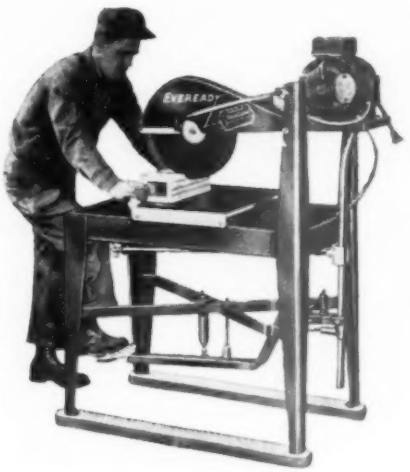
THE COMPRESSOR PEOPLE • WEST CHESTER • PA.

(*Continued from page 222*)

handpieces. Coupling comprises a sliding sleeve on the handpiece of the straight or angle spindle which locks four steel balls in an annular groove, thereby allowing the handpiece to swivel but not to be unintentionally disconnected. It requires two hands to operate the unlocking sleeve, which is a safety feature for the operator. All parts of the new unit are made of heat-treated steel, cadmium plated.

For More Details Circle No. 16—Page 219

Masonry Saw: Eveready Briksaw Co., Dept. F49, 1509 South Michigan Ave., Chicago 5—Masonry saw is available for standard dry cutting and later can be converted quickly and inexpensively to wet cutting, it is claimed. Among its features are quick adjustment of cutting head height to accommodate different size materials, foot pedal control of cut and cutting head angle and automatic spring adjustment of blade pressure to the hardness or softness of the material. Dry abrasive, wet abrasive and diamond blades in a wide range of formulas are available.



For More Details Circle No. 17—Page 219

Rotary Wire Brush: Hewitt Rubber Division, Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5—New rotary wire brush has the wire bristles embedded in rubber centers. The rubber core is said to eliminate localization of bristle fatigue by allowing the wire bristles to flex over a gradual arc of their entire length. Thus the bristles are not prematurely broken and thrown out. Flexibility of the rubber core enables the bristles to return upright after each contact with the surface to be brushed. It is claimed that less pressure is required to maintain the wheel and work in contact, and a more uniform finish is obtained. The brush face

(*Continued on page 226*)

A. P. Green
REFRACTORY PRODUCTS

SATANITE

Slag Resisting Mortar

Retards Joint Erosion in

- Malleable Iron Air Furnaces
- Ladles
- Electric Furnaces
- Cupolas
- Hot Metal Mixers

Unretouched photo of a section from a malleable iron air furnace side wall showing protrusion of SATANITE joints after firebrick had worn back several inches.

SATANITE comes to you packed in 100-lb. moisture-proof multi-wall bags.

SATANITE has been developed by A. P. Green to extend the life of firebrick joints in all types of furnaces and ladles in which molten iron or steel is in contact with the brick and joint erosion is unusually severe. In such service, SATANITE retards erosion—joints actually protrude $\frac{1}{8}$ to $\frac{1}{4}$ inch beyond the surface of the brick after the brick have been worn back several inches.

In malleable air furnaces, where side walls and bottom are laid up with SATANITE, any part of them can be easily removed for patching or rebuilding. SATANITE'S long service life in joints gives additional protection to side wall and bottom brick.

Order from your nearby A. P. Green distributor —he's listed in the yellow pages of your telephone directory or write us for more information.

A. P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U. S. A.
A. P. Green Fire Brick Co., Ltd. in Canada

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS" FLUX "B"
for
BRASS AND BRONZE

"Falls" Flux "B" cuts melting costs by reducing rejections and scrap caused by dirty metal.

1. It increases metal yield about 3% by putting all the metal usually lost in the dross back into the molten metal.

2. It cleans, fluxes and removes gases, oxides and non-metallic impurities from all grades of brass and bronze.

A dry white powder, "Falls" Flux "B" does not smoke, fume or smell will not absorb moisture, and can be handled with the bare hands without burning the skin.

WRITE FOR COMPLETE DETAILS

NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 17, NEW YORK

(*Continued from page* 224)

is said to conform readily to uneven surfaces and the bristles may be worn down to the rubber flange. The wheel is offered in 6, 8 and 10-in. sizes and may be used on either bench or portable tools.

For More Details Circle No. 18—Page 219

Abrasive Wheels: Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37—Slightly flexible synthetic resin bonded grinding wheels

are manufactured from laminated sheets of cotton fibre filled with abrasive grain. Their field of application is between that of heavy grinding and light sanding as well as for certain types of abrasive cutting-off, deburring and finishing operations. They are offered in 7 and 9 in. depressed center type for use on portable disk sanders and right angle type portable grinders and in straight wheels 6, 8, 10 and 12 in. by ½ in. thickness for cutting-off and general purpose use.

For More Details Circle No. 19—Page 219

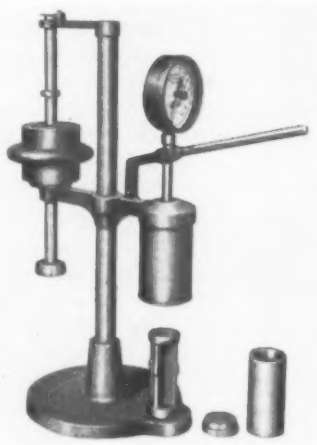
Scrap Truck: Factory Service Co., 4615 North 21st St., Milwaukee 9—Scrap truck consists of a bin-like superstructure made of steel plate panels welded to a flat steel deck transport. Fabricated steel channels, built to accommodate the forks of standard fork lift trucks, extend from front to rear panels just above the transport deck. A revolving head

fork truck can pick up the unit from either front or back, turn it to any desired angle, or upside down for

dumping. A hand jimmy converts the stationary bin to a maneuverable hand truck. The scrap truck is available with steel sides 20, 24, 28, 32 or 36-in. high, with corresponding capacity up to 22 cu ft. It is equipped with cast steel or rubber tired wheels (equipped with pressure lubrication fittings) and antifriction bearings. Through use of a stacking unit the trucks may be stacked one on top of the other for storage purposes.

For More Details Circle No. 20—Page 219

Sand Tester: Precision Scientific Co., 3737 West Cortland St., Chicago 47—Combination rammer-compression tester for bonded sands was designed to conform to the recommendation of the committee on foundry sand research of the American Foundrymen's Society. A specimen is prepared by ramming the sand inside a sleeve located on the post. After ramming, the specimen is stripped from its container without handling and is ready for testing in



the position in which it was rammed. A spring dynamometer operated by a hand lever is used to measure the forces in compression. A reset pointer on the gage indicates the maximum load in pounds per square inch on the test specimens.

For More Details Circle No. 21—Page 219

Automatic Ladling: Lindberg Engineering Co., 2444 West Hubbard St., Chicago 12—Automatic ladling is a new development in removing molten aluminum from melting furnace to die casting machine. A hollow graphite block and a graphite tube are mounted on the furnace cover connecting the discharge chamber of the furnace to the injection sleeve just ahead of the piston. Also extending through the cover is a pressure line connected to a nitrogen tank. A timer, synchronized with the die casting machine controls, opens a valve in the nitrogen

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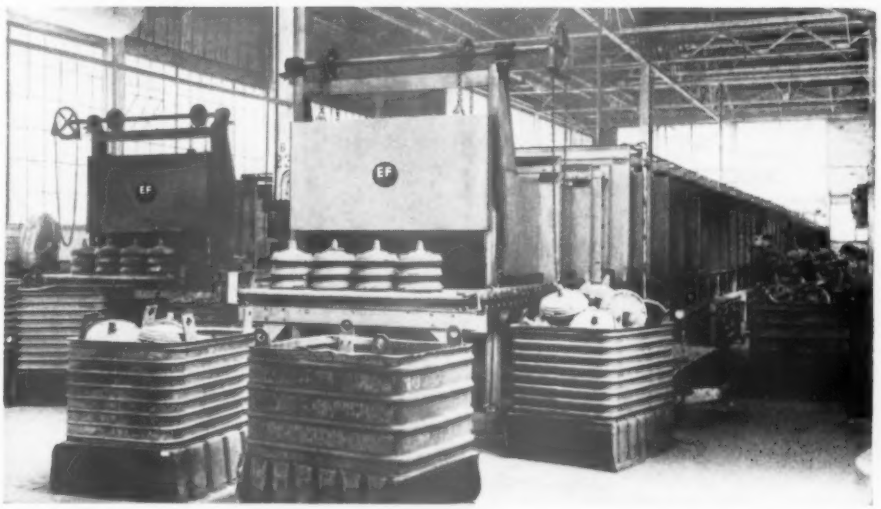

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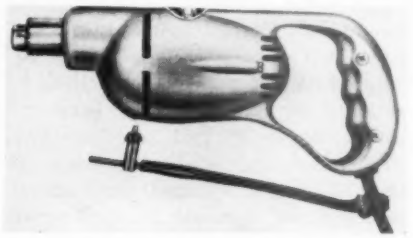
line to admit approximately 1 lb of pressure to the surface of the molten metal. By regulating the length of time pressure is applied, the amount of pressure, and the diameter of the graphite pipe, the quantity of molten metal forced into the die casting machine can be controlled accurately, it is claimed.

For More Details Circle No. 22—Page 219

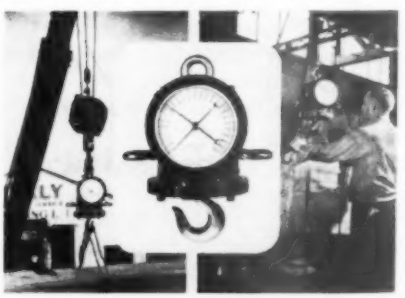
Electric Drill: Cummins Portable Tools, 4740 North Ravenswood Ave., Chicago 40—General utility electric drill with capacity of ¼-in. in metals and ½-in. in wood has a die cast aluminum frame, 10 in. in



overall length and weighs 3 lb. Adequately ventilated motor operates on 115 v ac or dc. Thumb switch is recessed in top of handle to prevent accidental starting of tool. Drill is equipped with 8 ft of rubber covered cord with 2-prong rubber plug.

For More Details Circle No. 23—Page 219

Crane Scale: A. H. Emery Co., 692 Main St., Stamford, Conn.—Crane scale is designed primarily for measurement of loads as they are handled by a crane, although it also may be used for other force and/or load-measuring applications. A hydraulic cell in the scale converts force into corresponding fluid pressure which is connected to a pressure indicator, calibrated to read in pounds of load on the scale. The scale meas-



ures from approximately 22 in. to 36 in. in overall height, depending on the model. Hook and eyebolt are swivel mounted. Dial diameters are 8½, 12 and 16 in., and all have a simple adjuster for setting the pointer to zero. A red maximum pointer can be furnished upon request. Scale accuracy is guaranteed within 1 per

(*Concluded on page* 230)

Wells Mfg. Co.'s new foundry in Skokie, Ill. Its 28,800 sq. ft. of floor is well covered by Fremont cast iron jackets and magnesium flasks. They're standard equipment.

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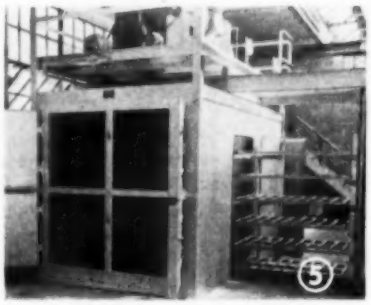
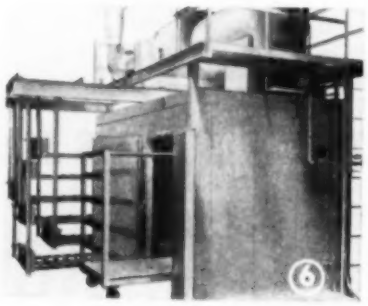


FIGS. 5 & 6—A Combination Shelf. Drawer and Truck Type Oven. Heat is furnished by one efficient Lanly forced convection system.



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OVENS FOR INDUSTRY
780 PROSPECT AVENUE
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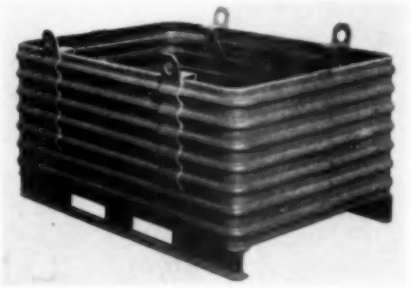
(*Concluded from page* 228)

cent of reading, or 0.2 per cent of capacity. Various models are offered with capacities ranging from 0-1000 lb to 0-30,000 lb.

For More Details Circle No. 24—Page 219

Stacking Box: Palmer - Shile Co., 16033 Fullerton Ave., Detroit 27—Corrugated, all-steel, welded stacking box has four-way entrance for



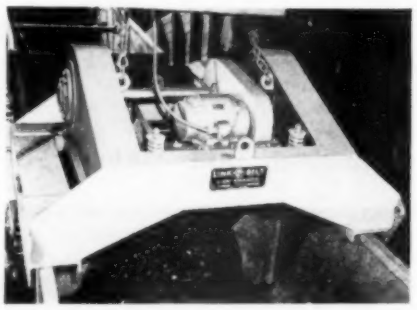
fork lift trucks. Boxes also have a corrugated bottom. Crane lugs, stacking brackets and channel runners are optional. Boxes are built to required dimensions, including underneath clearance. Load capacity, and color of paint desired, also may be specified.

For More Details Circle No. 25—Page 219

Shear: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—Cam-and-lever-actuated shear is designed to cut off flat strip stock with punch and die authority and precision. Its chief use is cutting off bandsaw blade square and flat in preparation for welding into a band. It will take blade up to 0.045-in. thick and 1¼-in. wide. It is said to produce a flat, smooth, square cut edge essential for accurate alignment of opposing pieces to be joined by brazing, or by butt or flash welding.

For More Details Circle No. 26—Page 219

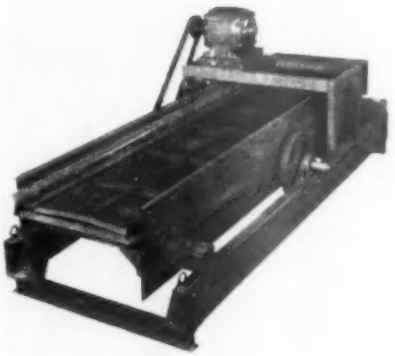
Car Shaker: Link-Belt Co., 300 North Pershing Rd., Chicago 9—Car shaker, a self-contained vibrator unit, is designed for the rapid, economical



unloading of bulk granular materials from open top, hopper-bottom gondola cars to conventional track hoppers. Cars need not be uncoupled for unloading. The car shaker, which normally is suspended from a hoist, is lowered to the top of the car to begin its operation. A feature of the shaker is its low frequency of vibration, which is said to result in relatively quiet operation. It is claimed that only 1 to 3 minutes is required to unload a car. Shaker weighs 9500 lb and is equipped with a 20 hp, 3 phase, 60 cycle, 220 or 440 v ac motor.

For More Details Circle No. 27—Page 219

Vibrating Screens: Screen Equipment Co., 1750 Walden St., Buffalo 21—Light-duty vibrating screens are available in single and double deck models in 1½ and 2-ft widths by 3, 4, 6 and 8-ft lengths. Triple deck models are made in the smaller sizes. They are constructed of 3/16-in. steel side panels and steel base frame. Operation of the screen produces a positive eccentric action, and a maximum vibration amplitude of 3/16 in. They operate on 1 to 2 hp at speeds up to 1150 rpm. They are said to take loads up to 15 tons per hour, depending upon the type of ma-



terial to be screened and the screen size. The units may be rigidly mounted or suspended from an overhead support with wire rope. They can be carried by two men for operation in different sections of a plant.

For More Details Circle No. 28—Page 219

Paint: Wilbur & Williams Co., Greenleaf & Leon Sts., Boston 15—Company has improved the penetration, gloss and weathering characteristics of its rust inhibitive paint which is a combined primer and finish coat. The paint is designed to get into rusted pits and inhibit rust at its source to control further corrosion. It also is said to permit painting of damp surfaces, squeezing moisture to the surface through its capillary action. It is available in red, black, olive green, light gray, machine gray, zinc chromate and aluminum, with coverage claimed at 800 to 1000 sq ft per gal.

For More Details Circle No. 29—Page 219

Go North, East, South *or* West... young man!

THE BETTER WE PRODUCE, THE BETTER WE LIVE

"Go West, young man, and grow up with the country." Horace Greeley said it in 1854. He was right . . . but he was also wrong. He was wrong because *all* of America turned out to have room for development then undreamed of.

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Here's what's happened all over America just during the last 40 years.

Income: Since 1910 we have increased our annual income per household from an average of less than $2400 to about $4000 (in dollars of the same purchasing power), yet—

Work hours: Since 1910 we have cut work hours down an average of 18 per week—equivalent to more than two present work days.

How did we do this? Through—

Machine power: We have increased the supply of machine power 4½ *times* since 1910. This increased machine power gave us—

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The best is yet to come

This is what we have done, and this is the way we have done it—to get higher wages, shorter hours, and lower-cost goods for everybody.

And this is the way we can make a still better living in the future—with *greater* use of machine power, *better* machines, *better* distribution, *better* collective bargaining.

Sure, our system still has faults . . . but none that we cannot cure if we all work together to do it.

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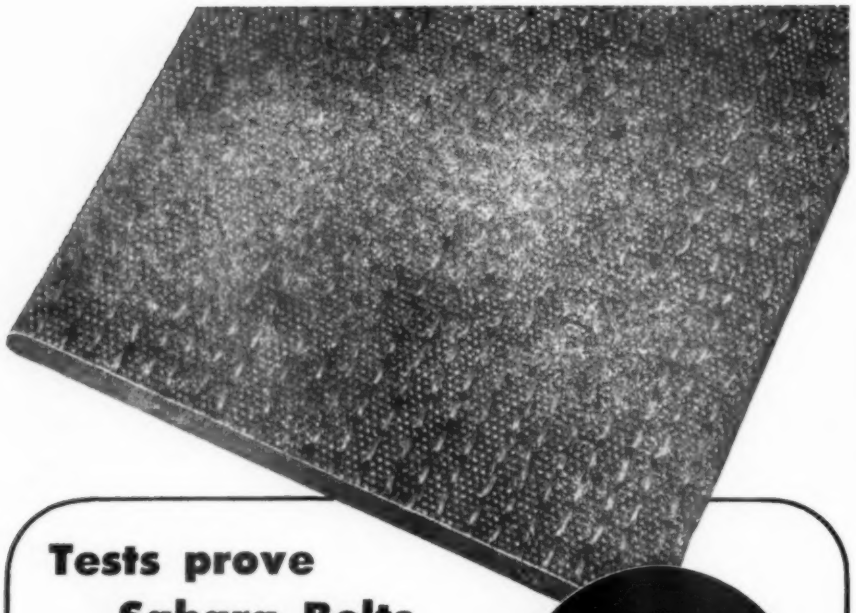

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Just because many foundrymen operate small shops, keep humping to run one cupola, and find themselves running small production, they think their plants are too small to benefit from outside engineering service. This is a mistake. Small operators, running close to margin, stand to gain great advantage by improving their methods and their equipment. Their very inability to absorb loss is their weakness. We can help eliminate this loss.

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LEE ROAD AT MAYFIELD — CLEVELAND 18, OHIO

SAND IN THE MILL VS. SAND IN THE MOLD

(*Continued from page 70*)

time. The use of histograms is indicated. This type of presentation has been popularized recently as a so-called "painless" method of presenting facts pictorially. However, histograms have a more important function in allowing a visual presentation of a mass of information not applicable to graphs and which otherwise could be presented only by long, involved, boring tables.

Let's look at Fig. 1, neglecting, for the moment, details as to the type of sand. Each column in each group of four columns represents the behavior of a sand under one of the five dip tests described previously. Tests 1 and 2 for radiant heat have been combined, so there are only four columns. Briefly, wherever there is a break in the histogram column, the sand did not behave satisfactorily at that point. For example, the group of histograms in the lower left hand corner of Fig. 1 shows a break in the continuous plus alternate immersion column between 9 and 16 seconds. The sand eroded at this time interval, did not erode at shorter and longer time intervals. This sand behaved very poorly under the more severe alternate immersion test, for as illustrated by the column for alternate immersion, the sand erodes at 9 seconds and keeps on eroding for the length of the test.

When judging the behavior of a sand from these histograms the time of failure as well as the type of failure must be considered. For example, the upper right-hand group of histograms of Fig. 1 illustrates a sand that behaves satisfactorily except under alternate immersion. This sand fails by spalling under alternate immersion at 18 seconds. If small molds are to be made of this sand, molds poured in less than 18 seconds will probably produce satisfactory castings. However, if the mold is such that molten metal flows over the sand for more than 18 seconds, bad scabbing is likely to be encountered.

So much for the test. What does the test tell about the effect of changes occurring in the sand after it leaves the mill or conditioner on its behavior when in contact with molten metal?

Evaporation—The moment sand is conditioned and ready for the molder, evaporation sets in, the amount of water lost by the sand depending on infinite variations in temperature,

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. . . and Form Gaggers, too

If core rod costs are a problem because of costly hand straightening or excessive purchases of new stock, the Core Rod Straightener will return you a nice profit.

A Chicago foundry, for example, saved 50% on the purchase of new materials and by replacing costly hand-straightening saved over 2,000 hours yearly. In shops where the machine is used the scrap pile is a thing of the past . . . labor and material costs go down . . . and the savings are sufficient to quickly return the investment.

No specialized talent is needed to operate the machine. Anyone can do it after a few simple instructions. It operates as fast as material can be fed into it. Rods can be cut to size quickly and accurately. An attachment for making gaggers is optional.

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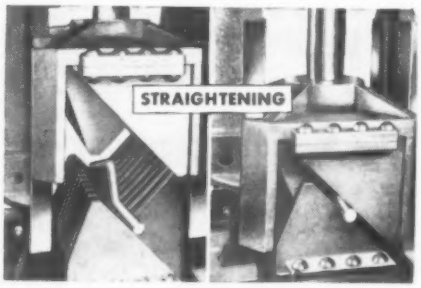

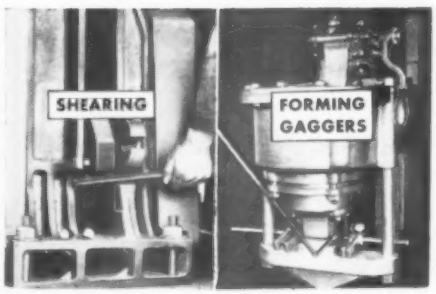

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AMERICAN WHEELABRATOR & EQUIPMENT CORP

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humidity and surface area exposed to the atmosphere. None of these variables are under effective control in the foundry today. To make matters more difficult and even more important, the loss in water content is not uniform throughout the sand mass.

The importance of slight variations in water content of a number of steel facing sands is illustrated in Fig. 1. A difference of 1 per cent or less in water content, whether the water varies at the mill or afterwards, can mean the difference between perfect behavior in the test and reasonably perfect behavior when in contact with liquid steel or very poor behavior in the test and a certainty of poor behavior when the sand forms the casting.

Sands that erode or spall under alternate immersion, as do all the low water content sands in Fig. 1, are very prone to so-called erosion scabs near the gate and much loose sand in the cope surface of the casting. Whether the sand erodes, as does sand *A*, or spalls as does sand *C* is not too important, for the difference is only one of degree. It seems to make no difference if the water content varies at the mill, or during handling, the end result is the same. The only difference is that the water content at the mill is under some kind of control; afterwards it is not.

Sand Loses Moisture

Sand *B* in Fig. 1 was mulled to 4.20 per cent water and part was allowed to air dry for one hour on a hot summer day to 3.3 per cent water. Note that it took only one hour for this sand to lose 0.9 per cent water, with disastrous results to the behavior of the sand when in contact with liquid steel. Many sand heaps and facing boxes in the foundry stand around for more than an hour before use.

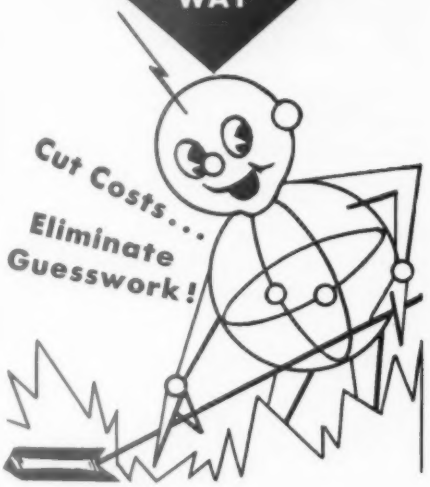
Four different base sands and three different combinations of cereal additions are illustrated in Fig. 1. The susceptibility of the various combinations to drying out is interesting but not too important, for the individual behaviors are applicable only to these particular sands and to no other. Each foundry must test its own sands, especially its reclaimed sands. However, the detrimental effect of too low water content, regardless of the latter's cause, will hold true for all sands, whether steel, iron or nonferrous. Just how detrimental and what the limits are cannot be generalized.

In production the surfaces of sand boxes and heaps dry out to much lower water contents than those in Fig. 1. About the only precaution used in an attempt to offset this drying

NOW

IMPROVE Copper Castings

THIS CONVENIENT FOOL-PROOF WAY



Today, the more progressive foundrymen all over the U. S. obtain better copper and copper alloy castings by adding Lithium in the new, convenient cartridge form.

This eliminates the disadvantages common to other methods of adding Lithium. Moreover, it costs less and gives more satisfactory results.

These cartridges — metallic Lithium hermetically-sealed in copper tubing — come in three convenient sizes: 2.25 grams, 4.50 grams and 9.0 grams.

By using a suitable combination of these cartridges, any desired amount of Lithium can be introduced into the molten metal.

Added to copper base alloys in this manner, Lithium remarkably increases tensile strength as well as elongation. And, in most cases, there is a marked reduction in grain size.

As a degasifier of Nickel Bronze, Lithium cartridges prove highly satisfactory. A dense, fine grained metal is obtained.

In high conductivity castings, Lithium cartridges produce an electrical conductivity in the "as cast" condition from 95 to 98% I. A. C. S. Specific gravities of 8.90 have been obtained, indicating absence of porosity.

These results have been carefully checked by leading commercial foundries under conditions of regular foundry practice. You may obtain further details of these tests without obligation by writing us today.

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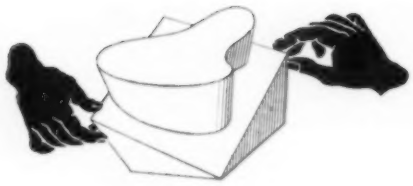

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The selection of a suitable steel and its subsequent satisfactory performance can be made easy by good design.

How and in what shape a part is made is, we hold, of fundamentally greater importance than of what it is made.

In designing a piece of machinery it is necessary to consider Design, the choice of steel, and its Heat Treatment. All three are highly significant factors, but of them we believe Design to be vital because even the best in steel and treatment will not save a poorly designed part.

To evaluate the importance of good design and its vital relationship to the selection of steel and its heat treatment, we have prepared a book—"Three Keys to Satisfaction". This starts by discussing mainly design factors involved in stress concentrations, and includes useful sketches comparing poor and good features of design from the aspect of subsequent metallurgy. It is available on request to all engineers and designers.

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MOLY

F10 F17

out is a feeble attempt by the molder to blend in the dry surface with a shovel or discard the dry sand on the surface. All this does is complicate matters and add to confusion. If the molder does a good job, perhaps the mold will get by, but this rarely occurs. What usually happens is that there are streaks of very dry sand in the mold. If one of these dry streaks is at the surface of the gate, or the mold cavity near the gate, this streak will erode badly and a dirty casting will be produced.

Perhaps the next mold will be made with sand from the center of the box or heap that has not dried out, or the dry sand is away from the gate and mold surface and a perfect casting will be produced. Is it any wonder the foundry industry is plagued with nonuniformity of sand defects? This one variable, uncontrolled water content of the sand entering the mold, can well be a major cause of this nonuniformity.

No matter how well the sand is controlled when conditioned, all this control is wasted if evaporation is not under control. From the standpoint of control this means closed metal containers for the sand that is to be in contact with molten metal, not open wood boxes and, above all, not sand heaps. Shovel mixing by the molder, wet sacks, unpainted wood facing boxes are, at best, poor stop gaps.

Even most modern sand handling equipment seems at fault in this respect, for the writer has never seen a sand hopper or sand chute that was not open at the top. The top layer of sand has an opportunity to dry out in between fillings and the molder will get a slug of dry sand in his mold at unexpected times when this dried-out layer comes through. Cannot these hoppers and chutes be closed and reasonably air tight? If facing sand boxes are used, cannot they be made of metal or painted wood, with covers and also be reasonably air tight? I give up on sand heaps! Certainly this type of equipment will cost a little more, but it will be paid for quickly if there is slightly less sand in the castings in the cleaning room.

Ramming—After the sand has been delivered to the molder, either in good condition or with the top 2 or 3 inches dried out to less than half the original water content, the molder rams the mold and a new variable must be considered and controlled—how the mold is rammed. This means not one area that is easily tested, but every square inch of the mold surface in contact with liquid metal, with particular attention paid to those surfaces subjected to the ero-

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sive action of flowing metal. This variable is so important that it was found impossible to evaluate a sand by the dip test at one ramming level. At least three ramming levels were found necessary, resulting in sand specimens with green hardnesses ranging from 50 to 90, to simulate the ramming levels encountered in production, not only from mold to mold, but, what is more important, from one area to the next in the same mold.

Fig. 2 shows how the behavior of one sand can vary if the ramming level as well as the water content are not under control. With the water content on the low side (3.15 per cent for this particular sand) the sand is worthless unless rammed very hard. A mold made of this sand at 3.15 per cent water, rammed soft to 50 green hardness, will erode so badly that the castings will be scrap. The bottom row of histograms in Fig. 2 shows that this sand, given one-half ram with the standard AFS rammer to 50 green hardness, erodes within 1 second on alternate immersion if allowed to air dry after ramming.

Ramming and Water Content Related

As the water content of this particular sand is increased, the behavior when in contact with liquid steel improves at all levels of ramming, as can be seen by the second row of histograms in Fig. 2. Note that the hard-rammed specimens show the better behavior until the water content exceeds 4 per cent. Above 4 per cent water this sand shows the detrimental effect of over-ramming, but even with this relatively high water content and very hard ramming the sand behavior is better than when dry and rammed soft.

Ramming and water content are so interrelated that the behavior of sand when in contact with molten metal cannot be evaluated unless both variables are considered simultaneously. This is certainly true when sand is in contact with liquid steel, whether in the dip test or in production. There is no reason to believe that the same interrelation does not hold true for all sands and all metals. It seems that a general statement can be made that the ramming level required for satisfactory performance of a sand in contact with molten metal must be higher the lower the water content. Again, exact values and limits must be determined for each individual sand.

This relationship between ramming level and water content has a number of implications for production. One, harder ramming must mean more energy expended, and energy in this day and age means money.

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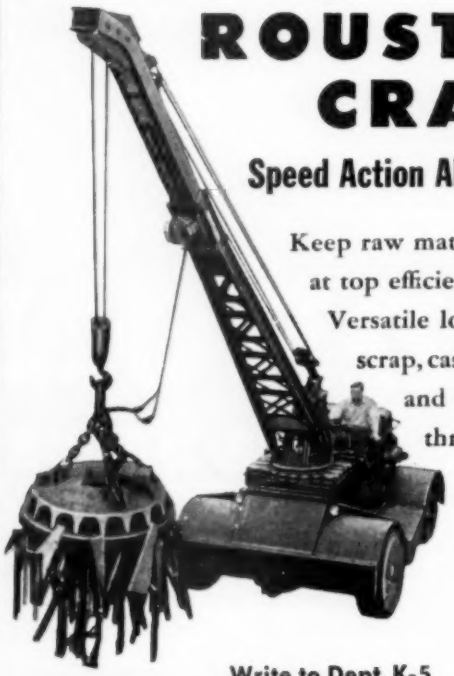

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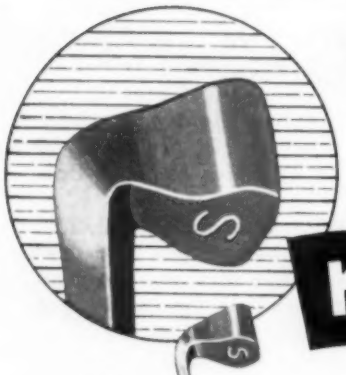

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Many foundries pride themselves on the low water contents of their sands. Many times they attribute the cleanliness of their castings to this low water content. Further investigation uncovers the fact that the foundry rams to a high green hardness, in many cases over 90. Perhaps the reason for their success is not low water content of the sand, but the high ramming level. Perhaps a higher water content would allow a lower ramming level with the same casting quality, less ramming energy expended and consequently greater molding efficiency.

Such a possibility depends primarily on control—control not only of ramming, but also the water content of the sand *at the mold*. Under present control, variations in ramming when added to variable water content of the sand at the mold decrease the probability of consistent molds and consistent castings. Not only must the water content of the sand going into the mold be controlled, but the mold must be rammed consistently to a level best suited to both the particular base sand and its water content. What is equally important is that the whole mold surface be rammed properly. A soft rammed spot the size of a quarter, if in an area subjected to erosion, will erode enough sand to cause trouble in the cleaning room or in the machine shop.

Evaporation After Ramming — Evaporation does not stop when the sand is rammed into the mold. The loss in water continues by natural evaporation, or is accelerated by artificial drying. Another important variable is introduced that affects the behavior of the sand when in contact with liquid metal. Fig. 3 shows the comparison between the behavior of the sand illustrated in Fig. 2 when tested green, before air drying, and after air drying. This sand is typical in showing the great difference in behavior due to water content at the time the sand contacts liquid metal. It is also typical, at least for steel sands, in that it shows more satisfactory behavior when green than after air drying.

This is another variable not under control in the foundry, especially on the squeezer floor where many molds are closed and poured immediately after ramming. Others may stand for hours, some for days before being poured. How many foundries even think of this variable, much less control it? Perhaps some of the mysterious variations in sand defects on castings from the same pattern can be traced to those molds that air dried over night or over a week-end before being poured, if a sand is used that performs satisfactorily when green, unsatisfactorily

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when dry. Conversely, if this variable is not under control, a sand must be used that performs satisfactorily both green and dry.

Another point suggested by Fig. 3 is—why spend time and money skin drying molds? All indications from the test are that the behavior of the sand is better before drying than after. This is true not only for the sand illustrated in Fig. 3, but for all steel sands tested by the writer to date. Of course, if the mold is sprayed for finishing, and wash or water much in excess of that present in the sand is added to the surface in any manner, it must be removed. Otherwise all advantages seem to lie in the simplest, cheapest procedure, core up, close up and pour.

If the mold is to be poured green, without drying, Fig. 3 indicates that it is advisable to carry the water content of the sand at slightly lower levels than if the mold is to be dried. Sand rammed hard and carrying a relatively high water content is prone to spalling and scabbing due to gas pressure, as shown by the tests on the specimens rammed 20 times containing 4.75 per cent water (Fig. 3). However, for any given controlled range of water and ramming, the green sands show greater resistance to liquid metal, especially erosion of moving metal, than do the dried sands.

The behavior of any sand when in contact with liquid metal cannot be evaluated by just a test or so. The three basic variables—water content as rammed, ramming, and water content when contacted by the liquid metal—are so important that all three variables must be considered simultaneously before a true picture of the sand's behavior be obtained and an evaluation of the sand be made. Even more important is the fact that these three variables must be controlled— the first two to rather close limits before there can be any consistency in behavior of the sand in contact with molten metal. We cannot hope for consistent castings until this control is accomplished.

Finishing—Another important step in making the mold, particularly the larger ones, is finishing. Here is another potential cause of serious sand defects that is not generally appreciated and far from under control. In a study of these variables the end of the standard AFS test specimen, before stripping from the tube, was slicked, sprayed and finished nailed. The specimen was then tested the same as those shown previously. Some typical results are shown in Fig. 4. Again the exact behaviors shown in Fig. 4 apply only for this particular sand. Other sands may show slightly

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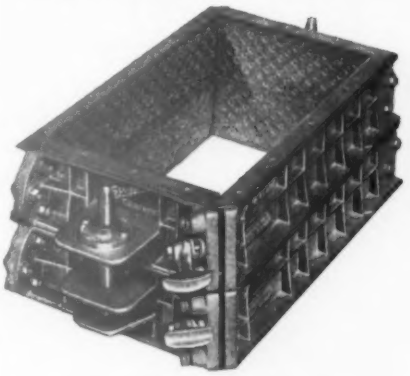

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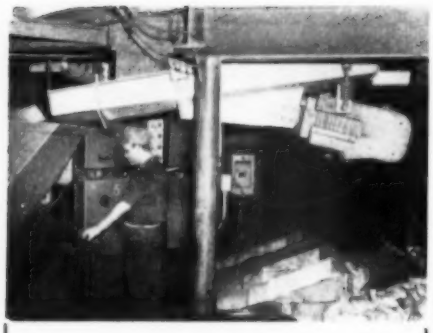

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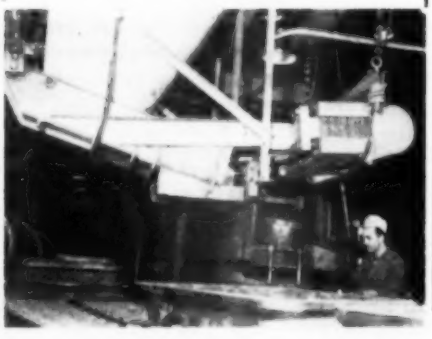

different behaviors, but they will differ only in degree.

Comparing air and skin drying, it can be seen from the two lower rows of histograms in Fig. 4 that there is no appreciable difference in the behavior due to accelerated drying, provided the surface is not burned. The same results were obtained using a gas torch rather than infra-red except that more care was required to prevent burning the corners of the specimen with a flame. If the corners are burned, they spall immediately under alternate immersion, as would be expected.

Finishing by slicking alone, as illustrated by the third row of histograms in Fig. 4, in many instances can improve the resistance of the mold surface to the erosive action of flowing metal, especially if the surface is under-rammed. Of course, what occurs is that the finisher compacts the sand at the mold surface and increases the rammed density of the surface, just as if the mold had been rammed harder. Here is a quantitative evaluation of an important phase of the art of molding. This operation can and should be tested for every sand, for it is possible that some sands, especially those susceptible to over-ramming, will show a lower resistance to molten metal when finished with too much pressure on the finishing tool.

Spray the Mold Surface

Spraying the mold surface with water *after* finishing can be advantageous, as illustrated by the fourth row of histograms. However, the profound effect of incorrect finishing is illustrated by the fifth row of histograms in Fig. 4. Finishing and water spraying, if used alone or in this sequence, in general are beneficial. The reverse procedure, *excessive spraying first and then finishing* (with too much pressure) *will ruin any sand and any mold no matter how carefully it is rammed.* The behavior of all sands the writer has tested closely approach those illustrated by the fifth row of histograms in Fig. 4. Bad cope spalling occurred in a matter of 10 seconds or so when exposed to radiant heat, and almost instantaneous spalling resulted when sand finished in this manner was subjected to moving metal, simulated in the test by the two alternate immersion tests.

Of course, it is possible to spray lightly, not use much pressure on the finishing tool and make a fairly respectable mold. But how can these two operations be controlled? Control of the small test specimens is difficult enough, and the writer defies anyone to spray a large mold uniformly with the equipment avail-

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ble to the molder. Chance again. If the spots where there was a concentration of water are not slicked, well and good; if those areas that are slicked were not saturated with water, again well and good. Heaven help the cleaning room if an area was sprayed too much and finished with too much pressure. From the control standpoint the only answer is not to use this sequence of operations.

The reason for the sand's behavior with this sequence of finishing operations is simply excessive rammed density. When the sand surface is saturated with water, just a few ounces of pressure on the finishing tool will compact the sand at the mold surface much denser than the most powerful machine can ram the sand when it is at or near temper. To aggravate matters, only the surface is compacted to this extreme density and failure usually occurs at the junction of the areas of different densities.

Molder Takes Pride in Work

There is a peculiar psychological problem involved in this matter of spraying and then finishing—the molder's pride in his work. Unfortunately, the best looking molds, speaking now of larger molds, are produced if the mold surface is sprayed and then finished; and appearance means something to the conscientious molder. Such men are most prone to object to the elimination of this sequence of finishing operations. Why? Because under modern production methods they do not see the castings and must judge the quality of their work from the molds. This is a matter of education, not force. Just taking the spray-can away from the molder may make matters worse.

Then too there are many occasions when judicious spraying with water is a practical necessity. What to do on a hot summer day when a large wood pattern, in not too good shape, must be drawn from the mold with a crane and the mold is torn up pretty badly. Shake out the mold? There is no assurance that the next mold will be any better. The only practical answer is to patch the mold, and many times water spray must be used to do any kind of job of finishing.

One answer is finish nailing and this does help, as shown by the top row of histograms in Fig. 4. Again control, for the distance between nails is quite important. Five nails were used in the bottom surfaces of the test specimens represented by the top row of histograms in Fig. 4. Nails were spaced on 5/8-in. centers. One, two, three and four nails, spaced on longer centers, made very little improvement. With less than 5 nails the sand spalled between the nails,

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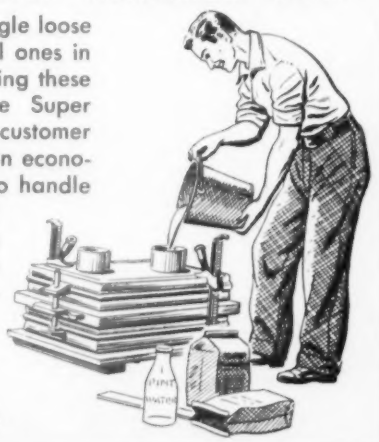

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a behavior every foundryman has experienced to his sorrow. Undoubtedly, the ⅝-in. spacing is not universally applicable; perhaps the spacing should be closer, or farther apart for other sands. The important point is that the proper spacing should be determined and then controlled.

Washing — One last operation in finishing. Many molds in the steel foundry are washed, usually with a proprietary wash whose base is silica flour. Here are more variables. One of importance is density of the wash and one that is not usually under control, for every Tom, Dick and Harry mixes his own wash. Fig. 5 shows the pronounced effect of density of the wash on the behavior of the sand (now the mold surface) when in contact with liquid steel. The wash used on the specimens in Fig. 5 is a proprietary silica-flour-base wash popular in the steel foundry industry.

There seems to be an optimum wash density for any given sand and ramming level; a wash that is either too thick or too thin can lead to poor behavior of sand in contact with liquid steel. Control again, control that must be established by each foundry for its own particular sand and molding practice. The dip test is an efficient method of establishing the limits so necessary for control.

Summary — Many of the uncontrolled variations occurring in foundry sand after it leaves the muller or conditioner have a greater effect on the behavior of the sand when in contact with liquid metal than do gross variations in conditioning procedure and in raw materials. Some of the more important that have been investigated are: Evaporation during handling, ramming, evaporation after ramming, finishing, washing.

Until the effect of such variables are investigated by each foundry and limits established and adhered to, it is the writer's firm belief that there can be no hope for castings consistently free from defects caused by sand. The effective control of these variables is the most important problem facing the foundry industry today.

Compile References

Engineering Societies Library, 29 West 39th St., New York 18, has published a bibliography of 111 selected references up to early 1949 which relate to theory, design problems, industrial applications and production methods dealing with the lost wax process of precision casting. Copies may be secured for $2.50.

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PYROMETER CONTROLLERS: Wheelco Instruments Co., 847 West Harrison St., Chicago 7—Illustrated bulletin PC-1 describes a series of indicating, pyrometer controllers for temperature, voltage, current, speed and similar variables in process industries. Bulletin Pl-1 describes cabinet type instrument panels for mounting the above and other instruments and auxiliary control equipment.
For More Details Circle No. 90—Page 219

WELDING ACCESSORIES: Air Reduction Sales Co., 60 East 42nd St., New York 17—Second in a projected series of ten catalogs covers both oxyacetylene and electric arc accessories, including goggles, hose, sparklighters, gloves, electrode holders, cable, weld cleaning tools, helmets, face shields and other items. Perforated for binder or loose leaf filing, the catalog includes over 50 illustrations.
For More Details Circle No. 91—Page 219

GEARMOTORS: Link-Belt Co., 307 North Michigan Ave., Chicago 1—Book 1815A on gearmotors covers double and triple reduction units of new design. Dimensions are shown for gearmotors having open drip-proof, splash-proof, totally enclosed and explosion-proof motor enclosures. Data tables facilitate selection of proper motor size and sprocket wheel diameters, and list maximum permissible overhung loads.
For More Details Circle No. 92—Page 219

POLISHING MACHINES: Hammond Machinery Builders Inc., 1637 Douglas Ave., Kalamazoo, Mich.—Bulletin 10 describes a new line of junior automatic polishing and buffing machines, said to increase production as much as seven times over hand polishing operations. Models include single spindle, two spindle, manual indexing and four spindle, power indexing machines for high-production polishing of small parts.
For More Details Circle No. 93—Page 219

BLAST CLEANING: Pangborn Corp., Hagerstown, Md.—Bulletin 300A is a catalog of accessories and supplies for blast cleaning, compiled from correspondence of the company's accessory department. Included in the catalogue are safety accessories, steel shot, nozzles, etc., with illustrations and descriptions.
For More Details Circle No. 94—Page 219

PRECISION VALVES: Hanna Engineering Works, 1765 Elston Ave., Chicago 22—Catalog 251 gives illustrations, descriptions, specifications and operating data on the company's valves. The line consists of foot and hand operated valves for air and hydraulic lines and speed control valves for use with air and hydraulic cylinders. Many new valves are introduced, with circuit diagrams included.
For More Details Circle No. 95—Page 219

MEASURING INSTRUMENTS: Foxboro Co., 32 Neponset Ave., Foxboro, Mass.—Bulletin 427 presents a complete line of instruments for process measurement and control. Principles of operation, details of construction, and advice as to choice under varying conditions, are described. Instruments shown include multi-record, segmental and scanning recorders for charting individual and periodic temperature checks.
For More Details Circle No. 96—Page 219

ABRASIVES SERVICE: Carborundum Co., P. O. Box 337, Niagara Falls, N. Y.—Illustrated book, "The Finest in Coated Products, Carborundum," presents outstanding features of its new service, research and production facilities at Wheatfield, N. Y. Information on demonstration and experimental grinding laboratories which offer service facilities to customers, is given.
For More Details Circle No. 97—Page 219

DUST HELMET: W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland 2—Bulletin 97 presents complete information on a pure air helmet for protection of sandblast operators against inhalation of dust as well as for protection against rebounding abrasive. All metal parts are of aluminum, one-piece hood is made of high grade rubber.
For More Details Circle No. 98—Page 219

IMMERSION HEATING: Surface Combustion Corp., 2375 Dorr St., P.O. Box 907, Toledo 1, O.—Illustrated bulletin SC-142 shows application of suction and atmospheric type burners to typical immersion heating installations. Tables show heat requirements for water in open tanks, both dip and spray types.
For More Details Circle No. 99—Page 219

DIAMOND WHEELS: Manhattan Rubber Division, Raybestos-Manhattan Inc., Diamond Wheel Dept., 61 Willet St., Passaic, N. J.—Catalog describes types, lists sizes, prices and other data on the company's resinoid bonded diamond wheels.
For More Details Circle No. 100—Page 219

AIR EQUIPMENT: Mead Specialties Co., 4114 North Knox Ave., Chicago 41—"Air Power Catalog—1949" presents the company's line of

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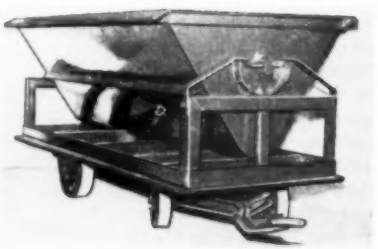

Dump hoppers are simple contrivances; they are just bins that dump. But first class, high quality, long wearing dump hoppers are something else. We designed and built them for foundrymen; they're built to give better service, they handle easier and they last longer. Pictured here are two styles: side dumping and end dumping. Wherever they are installed, they save money and improve efficiency. You will want to know more about them, of course. Simply write for our free catalog "T"; it describes and illustrates the complete Rose line of industrial materials handling equipment.

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ESTABLISHED 1919

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air-operated devices. A complete line of horizontal and vertical thrust air cylinders is shown with diagrams of installation and specifications. Also included in the catalog is descriptive matter on air presses collet fixtures, work feeders, timers, impact hammers, valves and air line accessories.
For More Details Circle No. 101—Page 219

STRAIGHTENING PRESSES: Hydraulic Press Mfg. Co., Mount Gilead, O.—Bulletin 4902 describes two-way all-hydraulic straightening presses designed to handle multiple straightening operations without moving the casting or other part once it is positioned on the press bed.
For More Details Circle No. 102—Page 219

TRACTOR-SHOVELS: Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.—Job study 10 tells by description and illustrations how one foundry solved many materials handling problems by using the company's tractor-shovels.
For More Details Circle No. 103—Page 219

MECHANICAL RAMMING: Eastern Clay Products Inc., Jackson, O.—Bulletin describes a new process using a new machine for mechanical ramming of refractory linings and patches in cupolas and for similar purposes.
For More Details Circle No. 104—Page 219

AIR SAMPLER: Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8—Illustrated bulletin CT-9 describes an electrostatic sampler for quantitative sampling of airborne dusts, fumes, and smokes.
For More Details Circle No. 105—Page 219

ELECTRIC TOOLS: Independent Pneumatic Tool Co., Aurora, Ill.—Illustrated circular describes a line of portable electric tools including impact wrenches, grinders, drills, sanders, polishers, and saws. Sizes, specifications and prices are listed.
For More Details Circle No. 106—Page 219

TRUCKS: Automatic Transportation Co., 149 West 87th St., Chicago 3—Catalog describes the company's line of industrial lift trucks. Photographs of all models are shown and physical characteristics and performance figures are given.
For More Details Circle No. 107—Page 219

POLISHING MACHINES: Buehler Ltd., 165 West Wacker Dr., Chicago 1—Bulletin describes polishing machines for metallurgical laboratories. It also lists accessories which are available.
For More Details Circle No. 108—Page 219

GEARSHIFT DRIVES: Lima Electric Motor Co., Lima, O.—Bulletin DB-1 covers gearshift drives, electric motors, pedestal grinders and buffing and polishing lathes.
For More Details Circle No. 109—Page 219

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BUCKEYE HIGH TEMPERATURE FURNACE CEMENT

Silicon Carbide Base Cement.
For use in any crucible or non-crucible (open flame) type furnace.
Coarse grain Cement for ramming in furnace and monolithic walls.
General all around cement that works well on cupola spouts, ladles, retorts, etc.
Recommended as wash on fire brick or lining.

No. 91 HIGH TEMPERATURE FURNACE CEMENTS

Neutral Cement—Does not react with molten alloys either ferrous or non-ferrous.
Especially adaptable when laying in fire brick where extremely fine and close joints are required.
Wash over furnace walls, tuyere openings and furnace bottoms.
For emergency repairs on hot or cold surfaces or brick work, has coefficient of expansion as that of fire brick.

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1 Guaranteed to withstand temperature of 3200°—not affected by waste gases or fuels.
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3 High mechanical and compressive strength—withstands extremes of expansion and contraction.
4 Possesses remarkable radiation ability — more heat returned from furnace walls.
5 Reduces heat loss through lining.
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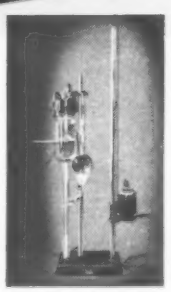

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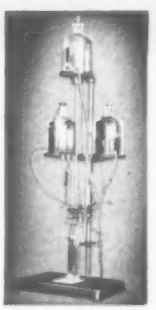

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No cracking or penetration—free of sulfur or carbon contamination.

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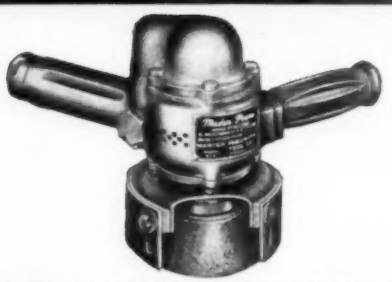
HARD CHROMED • PORTABLE PNEUMATIC TOOLS



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because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

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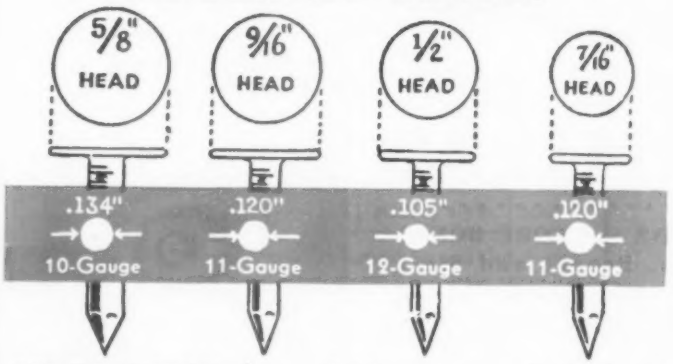

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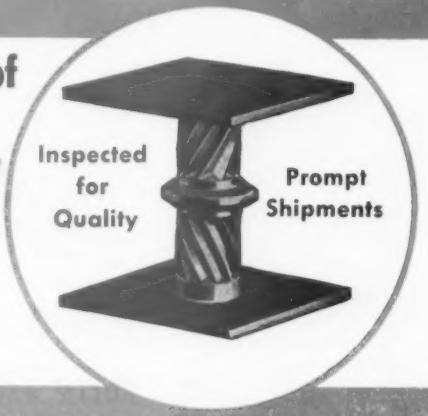

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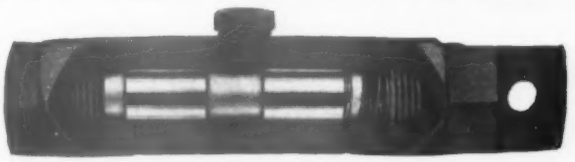

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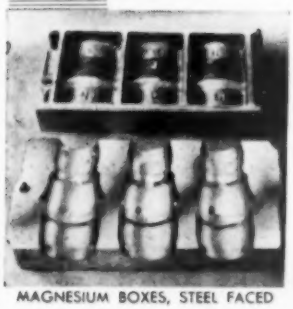

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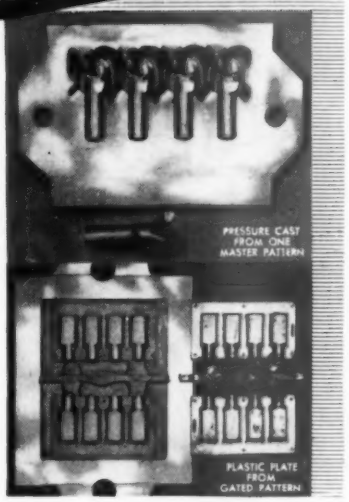

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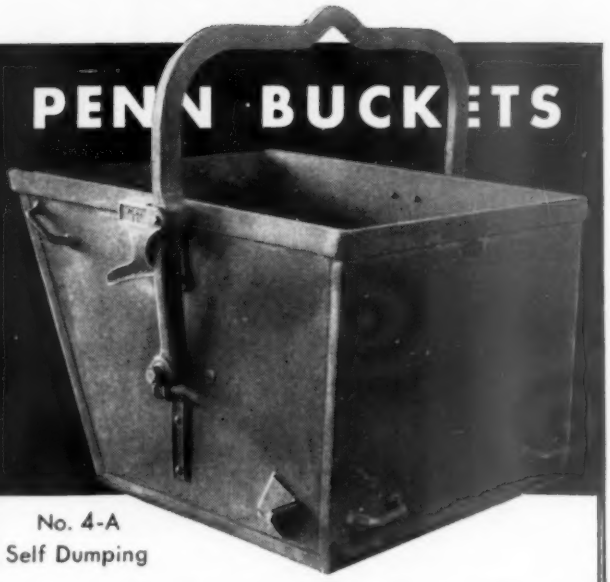

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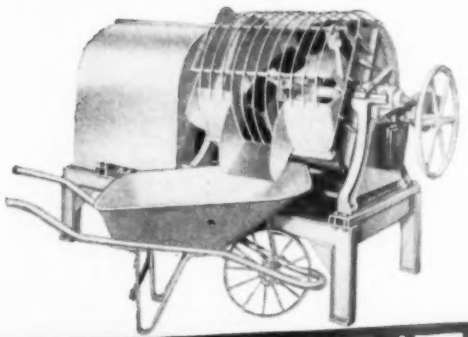

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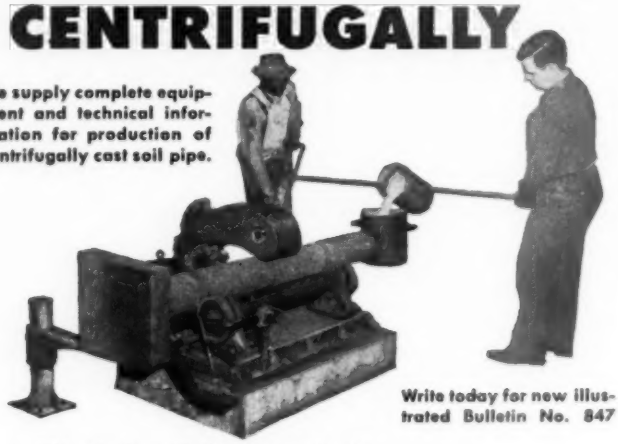
We supply complete equipment and technical information for production of centrifugally cast soil pipe.



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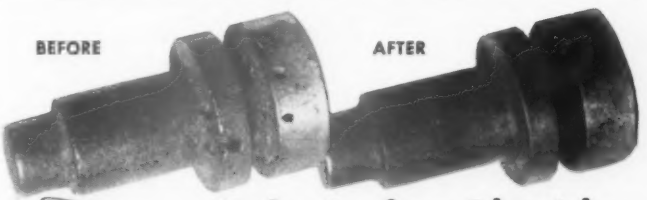
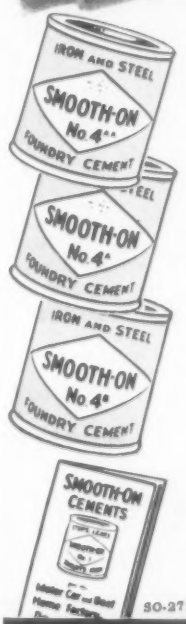
THE NEFF & FRY CO., Camden, Ohio





Make Surface Blemishes DISAPPEAR

Sand holes, blow holes, pock marks, dented edges make a casting unsightly—even though perfectly sound internally. Make these harmless blemishes practically invisible — with Smooth-On Foundry Cement. Leading foundries make this procedure as routine as trimming off "fins".

THREE SHADES

You can match color and texture. Smooth-On No. 4AA matches light gray, polished surfaces. No. 4A is for medium gray castings. No. 4B matches dark gray, coarser grained metal. These cements harden as part of the casting and stay in place, for they expand a little as they set.

FREE 40-Page Handbook

Shows not only Smooth-On Foundry Cement applications, but also many ingenious repairs made with other Smooth-On Iron Cements. 170 illustrations. Write for YOUR free copy.

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Do it with **SMOOTH-ON**
FOUNDRY CEMENT

THREE POINTS TO A GOOD ARGUMENT

1 castings sell better when they look better . . . .

2 clean, bright castings follow the use of quality foundry facings . . . . . .

3 Bloomsbury Graphite Co. supplies high quality foundry facings . . . . *and even ships free samples on request.*

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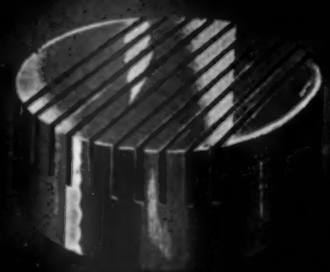

CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

BRASS SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS

Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

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Air-O-chek The Valve with the internal fulcrum lever

An invention in valve means

Ingenious lever arrangement makes conventional packing stem and gland unnessary.

Used in leading foundries and machine shops.

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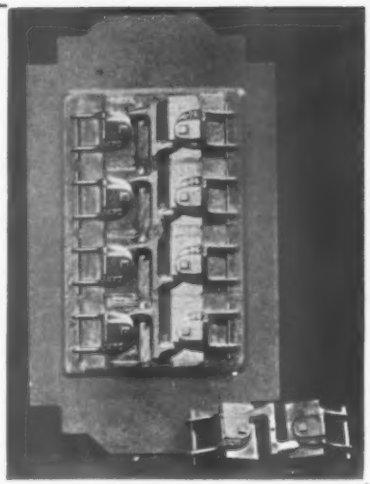
Pressure Cast Aluminum Matchplates and Cope and Drag Plates are the only Satisfactory Answer



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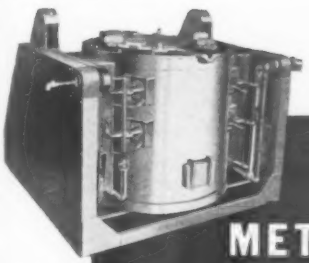
Pressure-Cast MATCHPLATES
COPE and DRAG PLATES



'Surface'
NON-FERROUS
METAL MELTING FURNACES

SELECTION TABLE

	TYPE	Max. Temp.	Series	Recommended for	Bulletin No.
TILTING	CRUCIBLE	2500°F.	TCR	Melting Brass and Copper	TC-45
		1400°F.	TCA	Melting Aluminum	TC-45
	POT	1400°F.	TP	Melting Aluminum and Magnesium	TP-45
STATIONARY	CRUCIBLE	2500°F.	CR	Melting Brass and Copper	CR-45
		1400°F.	AC	Melting Aluminum	AC-45
	POT	1400°F.	AM	Melting Aluminum	AM-45
		1200°F.	SM	Melting Soft Metals	AM-45
		1000°F.	SA SAV	Melting Soft Metals	SV-49

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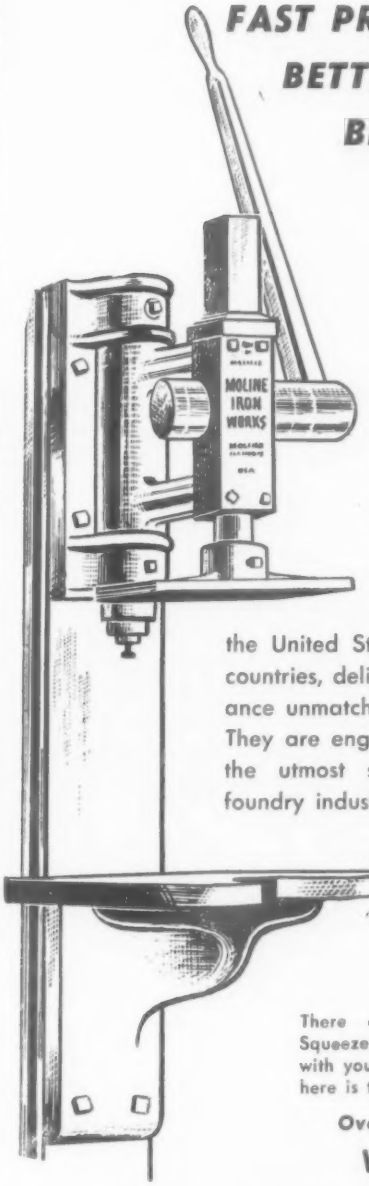
Moline
MOLDING MACHINES

FAST PRODUCTION
BETTER CASTINGS
BIGGER PROFITS



Moline Squeezers have a reputation for getting things done faster and better, and at lower cost. That is why they are being used in all types of foundries from coast to coast in batteries of from half a dozen machines to one hundred and sixty six. They are doing a big job in foundries all over the United States and in nine foreign countries, delivering a level of performance unmatched by similar equipment. They are engineered and built to give the utmost satisfaction to the vast foundry industry.

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There are five models of Moline Squeezers, designed in accordance with your specific requirements. Shown here is the No. 11 Stationary Machine.

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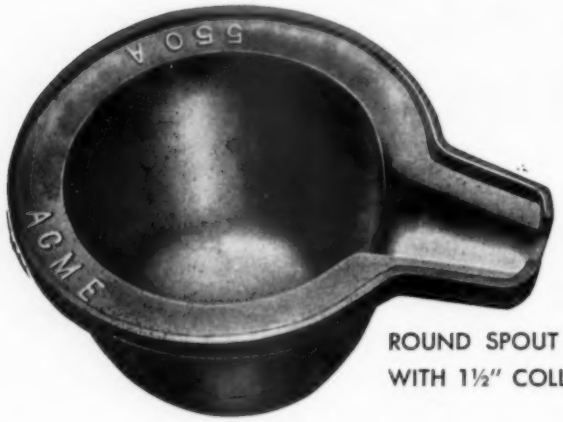
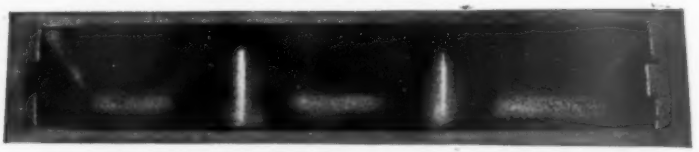
MELTING POTS—Ingot Molds

for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.





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ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE

HOLDING BOWL
NO. HP7001

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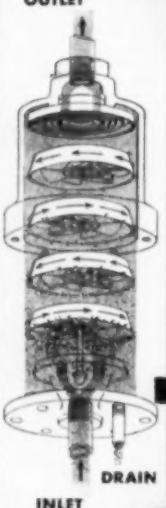
CLEAN YOUR AIR AND GAS LINES

Removes 92% Oil, Water and Dirt



The Aridifier gives you positive removal of oil, moisture and other foreign matter from air or gas lines. With paints and lacquers it often eliminates bloom and imperfections in finish. It provides dry lines for ceramics, sand blasting, for air cleaning, etc. Wherever the need exists for *dry clean* air or gas, the Aridifier delivers the goods. Easily installed. No maintenance problem. 10 models available. Capacity range: As low as 7 CFM to 17,000 CFM.

BULLETIN 147 Tells The Complete Story

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DEEP HEAD
Wide or Narrow Slots
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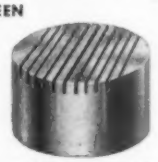

SHALLOW HEAD
Wide or Narrow Slots
.014 .010

We stock sizes from ⅛" to 1¼" dia. in 1/16" steps.

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- **Uniformity of holes**
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VENT CLEANER for cleaning slots

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18-inch Metal Cutting BAND SAW

Cuts heavy and light sections of metals, sheet metals, compositions and woods

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Write for Bulletin No. 192-S

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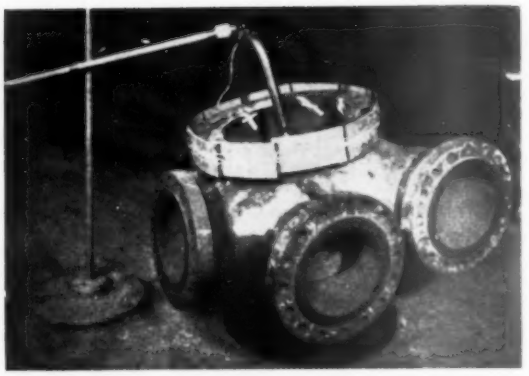
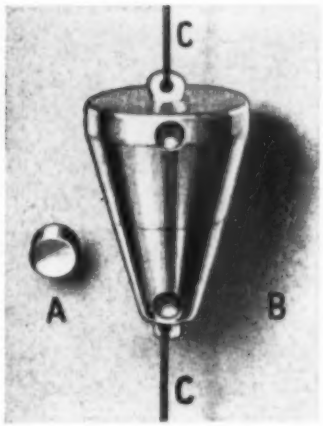
and make a short cut to more productive and economical foundry practice





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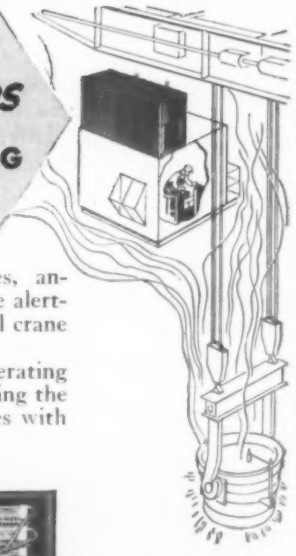

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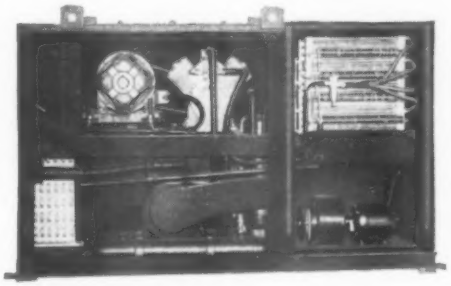

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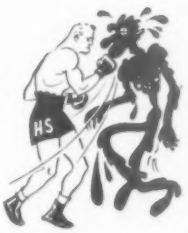

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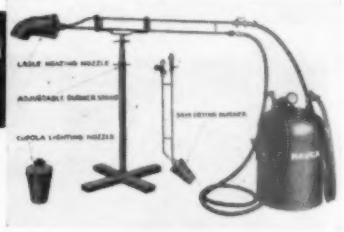

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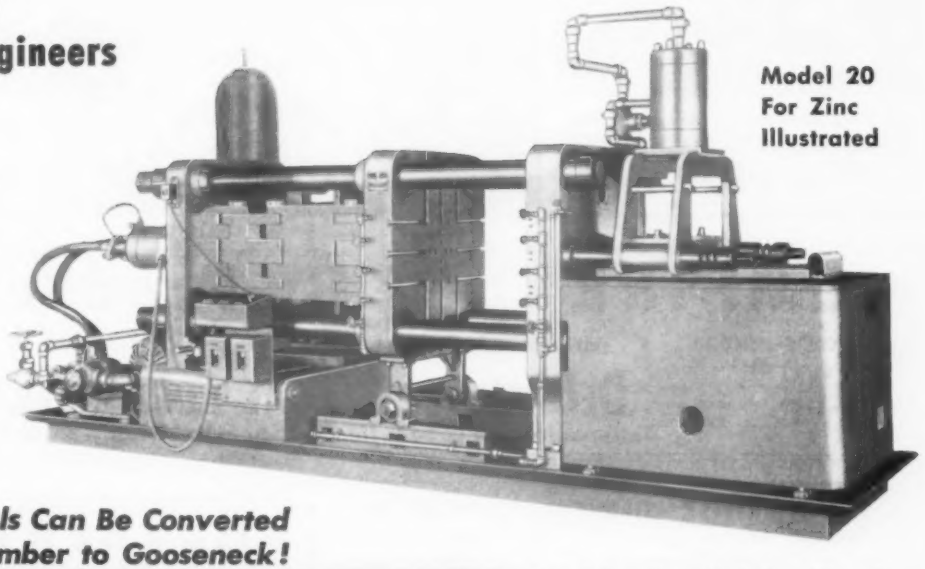

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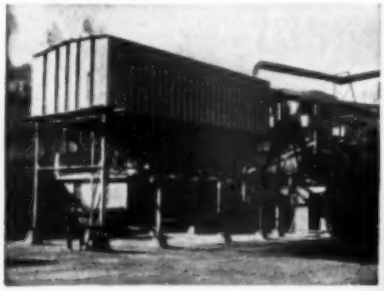

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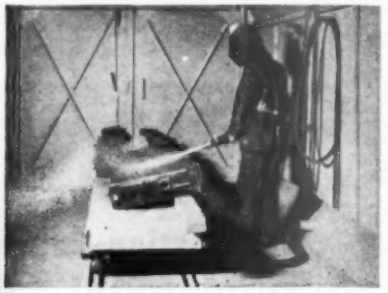

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Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

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Roots-Connersville Blower Corp., Connersville, Ind.

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INGOTS (Nonferrous)

Ajax Metal Co., Philadelphia 23, Pa.
American Smelting and Refining Co., 120 Broadway, New York 5
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP R.R., Cleveland 13, O.
Federated Metals Div., American Smelting and Ref. Co., New York 5
International Nickel Co., Inc., 67 Wall St., New York City 5
Northwestern Iron & Metal Co., 900 "T" Street, Lincoln, Nebraska

INGOTS (Nonferrous) (Cont'd.)

Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.
Sonken-Galamba Corp., Kansas City 18, Kansas
Western Metals Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

INJECTION MOLDING MACHINES

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio
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INOCULANTS

Carborundum Co., Perth Amboy, N. J.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

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Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

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Industrial Equipment Co., Minster, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS

A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, Ohio

LATHE CENTERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

LEAD

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

LINSEED OIL

Hercules Powder Co., Wilmington 99, Del.

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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

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Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill. New York 26, N. Y.
United States Graphite Co., Saginaw, Mich.

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Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, Ohio.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

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MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
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Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
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Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2821 Belmont Ave., Chicago 18, Ill.
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Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

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METAL CLEANING EQUIPMENT

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Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
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Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Co., Waterloo, Iowa.
Fordath Enginering Co. Ltd., West Bromwich, Birmingham, England.
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Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Multiplex Machinery Corp., Elmore, Ohio
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WELDING ELECTRODES (Carbon)

National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE BENDERS

Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE BRUSHES

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE NAILS

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

WOODWORKING MACHINERY

DoAll Company, Des Plaines, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y

ZINC

Federated Metals Div. American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

Classified Advertising

Help Wanted

GENERAL FOREMAN

For gray iron foundry with capacity of 30 to 40 tons per day. Located in lower Michigan. Foundry produces light and heavy castings on jobbing floors, squeezers and rockovers. Applicants must be under age 40. Excellent opportunity for advancement. This can be an unusual opportunity for the right man. Plant well equipped and company is strong financially with many years successful operation. Do not apply unless you have outstanding qualifications. Address: Box 672, The FOUNDRY, Cleveland 13, Ohio.

MOLDING FOREMAN

Experienced foreman for floor, machine and bench molding in aluminum. Excellent opportunity for man capable of training and supervising for production of sound castings. No metallurgical duties. Central Ohio location. Address: Box 618, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Wanted experienced foundry superintendent for gray iron foundry. Requirements—10 years' experience as foundry superintendent, thorough knowledge floor, bench, machine molding, core room, cupola and foundry maintenance. Address: Box 653, The FOUNDRY, 16 East 42nd St., New York 17, N. Y.

SALES MANAGER

Thoroughly acquainted with foundry sand practice and having acquaintanceship with purchasing agents, superintendents and foundry foremen. Location Chicago, covering entire United States. Replies treated confidentially. Address: Box 666, The FOUNDRY, Cleveland 13, Ohio.

COREROOM FOREMAN

Aluminum automotive foundry has fine opening for experienced supervisor. Capable of rigging and developing low cost operation. Man under 45 preferred. Modern plant located in Central Ohio. Address: Box 619, The FOUNDRY, Cleveland 13, Ohio.

SALESMEN

To sell gray iron castings in Metropolitan New York and Philadelphia areas. Must have following among users of quality gray iron castings. State full details. Commission. Address: Box 622, The FOUNDRY, Cleveland 13, Ohio.

MOTION & METHODS ENGINEER

Good opportunity for Motion and Methods Engineer in a large malleable and steel foundry located in the Middle West. Please give age, experience and salary expected. Address: Box 682, The FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL FOUNDRY ENGINEER

Experienced in jobbing foundry molding, gating and risering. Desire applicant in 30-40 age bracket. Job requires appreciable travel. Good opportunity for right man. Give full details on experience, schooling and salary requirements. Address: Box 687, The FOUNDRY, Cleveland 13, Ohio.

BRASS AND ALUMINUM INGOT SALESMEN

The following territories are open for experienced ingot salesmen;—Ohio, Michigan, Illinois, Iowa and Minnesota. Men with a following preferred. Address: Box 650, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

With experience selling grinding wheels Cleveland, Philadelphia and Pittsburgh area. In reply state age and salary expected and detailed experience. Address: Box 667, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

NONFERROUS FOUNDRY MANAGER OR SUPERINTENDENT

B.S. degree in metallurgical engineering. 14 years' practical experience in permanent mold, sand and investment precision casting. Production and cost conscious. Address: Box 680, The FOUNDRY, Cleveland 13, Ohio.

WORKS MANAGER OR FOUNDRY SUPERINTENDENT

Thoroughly capable and of proven ability to reduce costs, reduce scrap percentage and to better quality of castings. Good handler of labor relations. Ferrous metals. Address: Box 595, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Experienced in all phases of nonferrous work. Small medium and large castings. Capable of taking complete charge. Thirty years' experience. Would like connection with a high grade foundry. Employed now. Address: Box 669, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER—SUPERINTENDENT

48 years old with 31 years of practical experience from molder and melter to executive capacity in general jobbing and production foundries. Good rigger on all phases of pattern and molding procedure. Desires connection with reliable company that needs a man of my experience. Available November 1st. Address: Box 659, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR FOUNDRY SUPERINTENDENT

Twelve years' experience in producing aluminum, magnesium, stainless and heat resistant castings. Graduate engineer with complete knowledge of all phases of foundry work, casting design, labor management and sales trouble shooting. Address: Box 684, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOUNDRY FOREMAN

Thirty years' foundry experience. Practical molder. Understands cupola. Rigging for jobbing or production. Now employed as general foundry foreman, doing grey iron and aluminum jobbing. Address: C. I. LEE, P.O. BOX 112, FARLEY, IOWA.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 668, The FOUNDRY, Cleveland 13, Ohio.

ATTENTION FOUNDRY OWNERS

We have available experienced foundry executives, both iron and steel, men who will save their salary in cutting losses, increase production, savings, etc. No charge. Contact—**McLAIN'S SYSTEM INC., 326 E. NORTH AVE., MILWAUKEE 12, WIS.**

FOUNDRY SUPERINTENDENT OR MANAGER

Practical foundryman, energetic with twenty years' experience in jobbing and production or gray iron, bronze aluminum and kirksite. Automotive light, medium and heavy castings, made in green dry and loam sands. Ten years in supervision and management. Excellent record on labor relations and high productivity. Age 41, married, college graduate. Address: Box 635, The FOUNDRY, Cleveland 13, Ohio.

ELECTRIC MELTING FOREMAN

Eighteen years' experience on acid and basic iron and steel including all alloys for static or centrifugal castings. Desires connection with reliable firm. Now employed. Age 37. Best of references. Address: Box 505, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

CONSULTANT

In precision casting foundry operations. Plaster mold, pressure matchplate or investment precision casting. Address: K. Mierecke, 830 Elmwood Ave., Evanston, Ill.

FOUNDRY METALLURGIST

B.S. degree in metallurgical engineering. Experienced in producing steel in the three phase, direct arc, electric furnace, also familiar with melting grey iron in either the electric furnace or the cupola. Possess a good knowledge of laboratory procedures, sand testing and radiography work. Will make every effort to lower scrap losses and costs. Address: Box 465, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Experienced in all phases of foundry practice now available in any capacity. Familiar with present day labor conditions, costs, attitude of workers and qualified to do something about it. If interested address: Box 646, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Fifteen years' experience involving cupolas and electric furnaces. Any kind of iron made to close specifications. Versed in chemical and physical testing and sand control. Best references. Address: Box 557, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Twenty-six years' practical experience. Apprentice to manager. Sixteen years in supervision—8 years in meehanite. Producing machine tool, hydraulic, heat resisting, high tensile or castings to be flame or quench hardened, made in loam, dry or green molds. High production machine molding including sandslinger. Well versed in sand control—synthetic or natural. Capable trainer of apprentices. Address: Box 638, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MASTER MECHANIC

Over 30 years' experience in modern foundry. Specialist in sand handling system, can take complete charge of foundry maintenance. Supervised men past 25 years. Background tool maker, technical and engineering school. Employed now, can give good references. Address: Box 624, The FOUNDRY, Cleveland 13, Ohio.

PLANT MANAGER—SUPERINTENDENT

Thinking of making a change in your top personnel? Now is the time to do it for many capable men are available due to present business conditions. I have twenty-eight years of experience producing gray iron castings on production and jobbing basis. During the past seventeen years I have held the top position in managing plants employing up to 400 employes. Have a successful record, am 45 years of age, very reliable and in very good health. Address: Box 636, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Experienced in stainless, heat resisting and special alloys, also grey iron and steel. Metallurgical training. Familiar with all phases of foundry operations, willing to demonstrate ability on reasonable terms with progressive employer. Address: Box 625, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Desires position with progressive foundry. Ten years as general foreman and foundry superintendent in gray iron shop pouring up to 40 tons per day. Under 40—good references. Address: Box 640, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

MANAGER—SUPERINTENDENT

Is your trouble cost, sand, metal or labor relations? Castings to stand pressure a specialty. 32 years old. Practical gray iron foundryman. Sixteen years best of practical training. Ex GI working for degree. Now shop superintendent desirng more promising connection. Address: Box 633, The FOUNDRY, Cleveland 13, Ohio.

MANAGEMENT ENGINEER

AGE 41, COLLEGE EDUCATION, 19 YEARS IN FOUNDRIES, METAL TRADES, PRECISION INDUSTRIES. HAVE INSTALLED STANDARD DATA WAGE INCENTIVES, JOB EVALUATION, LABOR RELATIONS, PRODUCTION CONTROL, MANAGEMENT CONTROLS, METHODS. PRESENTLY EMPLOYED BY WELL KNOWN CONSULTING FIRM—DESIRES TO LOCATE PERMANENTLY. RESUME AND RECOMMENDATIONS FROM NATIONALLY KNOWN COMPANIES FURNISHED. ADDRESS: BOX 652, THE FOUNDRY, CLEVELAND 13, OHIO.

COLORADO, WASHINGTON, OREGON OR NORTHERN CALIFORNIA

Young family man desires to make home in one of these states. Has excellent college (6 years) and educational background, a foundry trainee course with large company and experience in production and jobbing plants. Well-versed in grey iron, malleable and good success with NODULAR IRON. Have operated and supervised cupola, air and electric furnaces. Good background and active in sand, laboratory, gating and risering, etc. Capable of management position. Presently employed as technical advisor. Address: Box 675, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

With thirty-five years' practical experience as a molder and foreman in light, medium and heavy castings, steel and gray iron. Age 53. Prefer New Jersey and New York metropolitan area. Address: Box 678, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

TOP FLIGHT FOUNDRY MANAGER AVAILABLE. EXPERIENCED IN ALL PHASES OF THE MODERN GRAY IRON FOUNDRY. TEN YEARS MEEHANITE EXPERIENCE, TECHNICAL TRAINING, RESEARCH WORK, DEVELOPMENT SALES AND CUSTOMER CONTACT. THIRTY YEARS' EXPERIENCE. ADDRESS: BOX 477, THE FOUNDRY, CLEVELAND 13, OHIO.

GREY IRON FOUNDRY EXECUTIVE

Thirty years' experience in the production of quality castings and all phases of foundry operation. Practical and technical. Green and dry sand. Mix iron by analysis. Cupola supervision, grey iron metallurgy, quality control, foundry costs, consulting and advisory work. Address: Box 676, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD FOREMAN

Able to set up and operate efficiently your permanent mold foundry using nonferrous alloys. Good metallurgical background. Address: Box 683, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY OWNER
PLEASE NOTE

I desire a connection as assistant to a foundry owner who will offer me an opportunity to apply a portion of my salary towards an interest in the company. My experience covers production and jobbing shops, making grey, malleable and now nodular iron with cupola, air and electric furnaces. I can handle sand, gating and risering and the rest of general foundry work. I am 34 and have an exceptional educational and practical background. No consulting or temporary inquiries please. Address: Box 674, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

Wishing to make change. Have had practical experience in all phases of foundry operations. Can furnish excellent references. Willing to prove my ability or no cost to you. Address: Box 663, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

METALLURGIST

Graduate Metallurgist, 13 years' experience in special metallurgical problems involving heat treating, specifications, development, stress analysis, trouble shooting, nodular irons; malleable, gray iron and steel. Prefer position with firm interested in development and production of nodular irons. Address: Box 630, The FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Foundry engineer seeks to represent in metropolitan New York and New Jersey a reliable gray iron or metal foundry. Commission basis. Excellent contacts. Address: Box 679, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Twenty-eight years' experience as foundry superintendent. Practical molder. Understand cupola thoroughly. Prefer position with foundry making high grade castings. At present employed. Address: Box 571, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER
OR
FOUNDRY MANAGER

Aluminum—magnesium—permanent mold designer and qualified management experience. Quality and production control. Tool and machine design. Ten years' experience. Capable of taking complete charge of permanent mold foundry. Address: Box 608, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY FOREMAN

Thirty years' experience in steel and high nickel alloy, small and medium size castings. Best of references. Address: Box 614, The FOUNDRY, Cleveland 13, Ohio.

STARVING FOUNDRYMAN

Desires position as sand technician or foundry foreman. Have attractive proposition for foundry needing this type employee. Interview invited. Address: Box 685, The FOUNDRY, Cleveland 13, Ohio.

Accounts Wanted

ACCOUNTS WANTED

Manufacturers' agent desires gray iron or steel casting account for the Chicago area.

BOX 631

THE FOUNDRY CLEVELAND 13, OHIO

ACCOUNTS WANTED

OF FOUNDRY SUPPLIES AND EQUIPMENT FOR EXPANSION OF ESTABLISHED SUCCESSFUL MANUFACTURER'S AGENCY LOCATED IN NEW YORK CITY. 30 YEARS' PRACTICAL FOUNDRY EXPERIENCE, WIDE PERSONAL ACQUAINTANCE WITH THE TRADE. ADDRESS: BOX 662, THE FOUNDRY, CLEVELAND 13, OHIO.

MANUFACTURER'S AGENT

Wanted additional lines. Can efficiently handle complete line of foundry supplies and equipment. Extensive practical foundry experience. Now covering Pennsylvania, New Jersey, Maryland and Virginia. Address: Box 656, The FOUNDRY, Cleveland 13, Ohio.

Engineering Service

Are you getting the maximum production out of your foundry and its equipment? If you don't think so contact—

PALMER E. HANSON
Foundry Production Engineer
648 Crescent Court
Wauwatosa 13, Wis.

I have thirty years' foundry production and jobbing experience to offer—nothing else to sell.

PRACTICAL—ADVISORY SERVICE

SAMUEL APPELBY
GRAY IRON FOUNDRY CONSULTANT

74 LAMARCK DRIVE **TELEPHONE**
BUFFALO 21, N. Y. **UNIVERSITY 7146**

IMPROVE QUALITY—REDUCE SCRAP—LOWER COSTS—HEAVY CASTINGS BY CONTROLLED METHODS

Representatives Wanted

REPRESENTATIVES WANTED

Manufacturer of controls for molding machines and mixers desires representation on commission basis. Must be established and now representing other foundry equipment manufacturers. Address: Box 658, The FOUNDRY, Cleveland 13, Ohio.

Personal

INFORMATION WANTED

Address of Wm. D. Van Arman, who some years ago was with The Lake Erie Smelting and Refining Co. of Cleveland. Address: WM. C. KEOUGH, 800 NATIONAL CITY E. 6th BUILDING, CLEVELAND 14, OHIO.

Capacity Wanted

MALLEABLE IRON & BRASS

Require squeezer capacity up to 50 tons weekly, cored and non-cored castings. Plumbing specialties and electrical fittings. Machining and cadmium plating. Advise full details. Address: Box 670, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

OPEN CAPACITY

Have open capacity for squeezer and light floor work. Address: ENTERPRISE FOUNDRY INC., 817 SOUTH BROADWAY, OKLAHOMA CITY 4, OKLAHOMA.

Employment Service

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Classified Advertising

Employment Service

SALARIED POSITIONS

$4,000 to $30,000. This confidential service for men who desire a new connection will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Address: TOMSETT ASSOCIATES, 1203 BERGER BLDG., PITTSBURGH 19, PA.

EMPLOYERS
ESTABLISHED 1922

Specializing in thorough screening of qualified personnel for any phase of operations in gray iron, steel, malleable, all non-ferrous and permanent mold foundries.

APPLICANTS:

If you can furnish QUALIFIED references, attesting to your CAPABILITY and DEPENDABILITY, your application will be accepted and we will secure for you the desired position.

IMMEDIATE OPENINGS
(Partial Listing)

MANAGERS
SUPERINTENDENTS
ASS'T. SUPTS.
GENERAL FOREMEN
CORE ROOM FOREMEN
MOLDER FOREMEN
CLEANING ROOM FOREMEN
CUPOLA SUPERVISORS
SR. INDUSTRIAL ENGINEERS
JR. INDUSTRIAL ENGINEERS
TIME STUDY ENGINEERS
PATTERN DESIGNERS
PERM. MOLD DESIGNERS
PERM. MOLD FOREMEN
PATTERN FOREMEN
MASTER MECHANICS
PLANT ENGINEERS
MAINTENANCE SUP'TS.
MAINTENANCE FOREMEN
LABOR FOREMEN
METALLURGISTS
CHEMICAL ENGINEERS
CHEMISTS
PRODUCTION CONTROL
SALES ENGINEERS
ACCOUNTANTS

If you are experienced in any phase of foundry operations—and desire to improve your future working conditions:

WRITE
EMPLOYERS SERVICE BUREAU
6 NORTH MICHIGAN AVE., SUITE 708
CHICAGO 2, ILLINOIS
TELEPHONE: Financial 6-1155

SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

Opportunities

OPPORTUNITIES

Fully equipped nonferrous foundry located in Detroit — going business — approximately 7000 square feet—building 30 feet high monitor type construction. Will sell or lease very reasonably. Address: Box 654, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Metallurgical balance for gray iron foundry laboratory. With or without balance weights. Address: Box 677, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Beardsley & Piper
Model 30, 40 or 50 speedmullor.
Forward full description, age, condition and price.

WOODRUFF & EDWARDS, INC.
ELGIN, ILLINOIS

WANTED

Cloth filter type dust collector with spark arrestor—10,000 to 15,000 C.F.M. capacity. Also vertical core oven. Sand specifications and price to: Box 664, The FOUNDRY, Cleveland 13, Ohio.

WANTED

1200 lb. capacity oil fired tilting crucible furnace. Address: Box 647, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Patterns for Bell and Spigot and Flanged cast iron fittings, sizes 4-inch and larger. Address: Box 612, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Used magnetic separator, 12 or 15" x 24". Magnetic or permanent. Address: Box 686, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Pridmore drop pattern stripping plate molding machines. Advise sizes available. ADDRESS: HARRY C. WEISKITTEL CO., INC., 4901 PULASKI HIGHWAY, BALTIMORE 24, MARYLAND.

Pattern Shop For Sale

FOR SALE

Well equipped pattern shop with blower system and plenty of supplies. All set up to go to work. Address: WESTERN PATTERN WORKS, 2100 SUPERIOR AVE., N.W., CLEVELAND 13, OHIO. PHONE MAIN 9371.

Foundries For Sale

FOUNDRY FOR SALE

Corporation desires to sell its gray iron production foundry near Kansas City. Good scrap market and utilities extremely low. Two railroad sidings. Capacity 10 to 15 tons daily. 30,000 sq. ft. floor space, pouring room 300 ft. long with overhead conveyors. Modern core room. Plant well equipped. Location presents many advantages for low cost production with ideal labor situation. Can be used for general manufacturing. Reasonably priced. Address: Box 602, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gray Iron Foundry—semiproduction and production castings, squeezer and light floor work. Leased buildings in surplus emergency labor area near St. Louis, Missouri. Ten to fifteen molders, fifteen to twenty ton melting capacity. Machine shop facilities and additional buildings available. Now in operation with orders on hand. Reasonably priced. Address: Box 673, The FOUNDRY.

Foundries for Sale

FOR SALE

GRAY IRON FOUNDRY. Well equipped for light work. Good organization. Profitable steady business. Priced low.

FOUNDRY & MACHINE SHOP. Equipped for heavy work. Highly skilled organization. A bargain for a company requiring a large foundry.

EDWARD H. ZOLL
Industrial Properties Throughout the East
790 BROAD ST. NEWARK, N. J

FOR SALE

Gray iron foundry. 60 miles from Detroit. 12 molder shop. Squeezer and light jobbing. Automatic charger on cupola. Plant now operating 15,000 sq. ft. Owner must sell. Address: Box 660, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Old, well established nonferrous foundry business employing 100 to 150 people with 1948 sales approximating one million dollars. Year 'round operations involve making and machining brass and aluminum castings for many large corporations. Modern office building and modern plant equipment includes complete crane coverage, 25 melting furnaces, fully equipped machine shop, centrifugal and permanent mold machines. Approximately 40,000 sq. ft.

BOX 649
The FOUNDRY CLEVELAND 13, OHIO

For Sale

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440	3/60	3600
1050	32 oz.	Spencer	15	550	3500
900	24	Spencer	15	220/440	1800
650	32	Spencer	10	220/440	3600
225	10	Spencer	1	220/440	3600
150	3 lbs.	Spencer	5	220/440	3600
PRESSURE BLOWERS (3 Phase, 60 Cycle)					
2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1300	16 oz.	Nth.Amer.	10	440	1800
1150	20 oz.	Nth.Amer.	10	220/440	3600
950	16 oz.	Nth.Amer.	7½	220/440	3600
660	20 oz.	A & B	7½	440	3600
550	20 oz.	A & B	5	440	3600
450	6 lbs.	A & B	30	220/440	3450
340	20 oz.	A & B	3	440	3600
250	12 oz.	Gen. Elec.	2	220/440	3600
150	12 oz.	Nth.Amer.	1	220	3600
150		McKee	1	440	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

FOR SALE

Pangborn Rotoblast—4 ft. table—Model 4LG with dust collector..... $975.00
Pangborn Rotoblast—barrel type Model 7 GK 2 New in 1944.
#4 Sly Blast Mill..... $225.00
Transite Core Plates—5 x 29 each 50c
712 PJ Osborn jolt strip squeeze machine. New in 1946—very good buy.
602 Osborn Molding Machine—1943.
(10) 4000 lb. Ingersoll Rand Air Hoists.
We can supply single items or complete foundries. Send your inquiries to:

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO

FOR SALE

100 Style LL Sterling steel flasks, 31¾" x 41" x 4" cope x 5" drag, 44" pin centers. Complete specifications on request. Excellent condition. Address: Box 634, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

For Sale

LIQUIDATION SALE

COMPLETE

FOUNDRY EQUIPMENT

To facilitate conversion of plant to make it available for industrial use, all foundry equipment will be sold. Some major items are listed below.

B & P Motive Jr. Sandslinger
B & P Sand Conditioner
Pangborn Shot Blast Room
12' x 25' Complete with Dust Collector
(New—never installed)
Hendy Mobile Yard Crane with lifting Magnet
3 Simpson Mullers (1 New)
No. 7 Whiting Cupola & Blower
Foxboro Air Weight Controller
American Sand Blast Room
American Dustube Collector
Sullivan W. G. 9 Air Compressor, 75 H.P. Motor
Sullivan No. 16 Air Compressor, 125 H.P. Motor
Boyer Sand Conditioner
Core Oven with Oil Burner
American Sand Cutter
14 Molding Machines
American Rod Straightener
8 Geared Crane Ladles
Complete Laboratory Outfit
Lincoln 300 Amp. Arc Welder
Miscellaneous: Grinders, Chippers, Air Rammers, Wood-working machines, Mold Dryers, Mold Wash Mixer, Flasks, Core Plates, Tumbling Mill, Crane Scales, Hoists, Jib Cranes, etc.

BRIDGMAN CASTINGS, INC.
BRIDGMAN, MICH.

IDLE FOUNDRY EQUIPMENT FOR SALE

6 Core machines
23 Molding machines
2 Gas powered sand cutters
4 Grind stands
15 Hand trucks
16 GE Motors, ¾ to 75 HP
And misc. foundry equipment
Subject to inspection at our plant or write for description of items you are interested in.

ALBION MALLEABLE IRON CO.
ALBION, MICHIGAN

FOR SALE

1—American Wheelabrator Size 20 x 27 complete with dust collector, spare parts
3—Tons #G 50 Grit
1—Gardner-Denver air compressor, complete with 10 H.P. motor
1—Fisher Blower with 10 Horse Motor
2—Time clocks
2—Furnaces with oil burners complete
25—13" x 18" steel flasks
12—12" x 18" steel flasks
Other miscellaneous foundry equipment.

H. G. WILLIAMS
7206 EAST TRUMAN ROAD
KANSAS CITY 3, MISSOURI

FOR SALE

One Olsen testing machine, 300,000 pounds capacity, in good condition.

BOX 627
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Two—#J-332-48 Osborn jolt rollover squeeze pattern draw molding machines. Machines are current model. In excellent repair, completely cleaned, painted and in good operating condition. Todays list $4890.00 each. Our price $3500.00 each F.O.B. Birmingham, Ala. Write to: PRODUCTION INDUSTRIES INC., BOX 591, BIRMINGHAM 1, ALABAMA.

FOR SALE

ELECTRIC MELTING FURNACE

TOP CHARGE 9 FT. DIAM. SHELL, WITH 2500 KVA TRANSFORMER. VERY LITTLE USED, IN GOOD CONDITION.

FRANK B. FOSTER, INC.
2217 OLIVER BLDG. PITTSBURGH 22, PA.

FOR SALE

1—Metal wash model 21A-32 washing, rinsing & drying machine with all equipment used one month—motors all 3 ph. 60 cycle—10 claridge fans, size C ½ with ¾ H.P. motors new.

Other size fans, motors, pumps and fittings. Bargain for quick sale.

H. LOEB & SON
4643 LANCASTER AVE. PHILADELPHIA, PA.

FOR SALE

1—#400 Fisher tilting furnace, motor driven.
4—Maxon premix blowers with ½ h.p. motors.
2—30" Hausfeld melting furnace without lining.
Several assorted blowers.

BOX 671
The FOUNDRY CLEVELAND 13, OHIO

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES
3—75J Osborn Jolt Squeeze.
2—SPO #611-B Stationary, Oscillating, Jolt, Squeeze Strippers.
1—SPO #4½ JHS Air Jolt Hand Strip.
4—Osborn #36 core box drawing machines.
1—74J-W Osborn Jolt Squeeze Portable.
2—75J-W Osborn Jolt Squeeze Portable.
3—75J Osborn Jolt Squeeze Portable.
1—Haynes 10" Jolt Squeeze Portable.
1—Haynes 12" Jolt Squeeze Portable.
3—Federal RAPID Jolt Squeeze Portable.
2—SPO #611B Stationary, Oscillating, Jolt Squeeze Strippers.
1—SPO #4½ JHS Air Jolt Hand Strip.
4—Osborn #36 Core Box Drawing Machines.
BLOWERS FOR CUPOLAS AND FURNACES
1—Piqua rotary pressure blower, rated 19 cu. ft. per revolution.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—Hausfeld 2000# Aluminum Capacity Furnaces. Barrel Type, Open Flame, Oil Fired.
2—Monarch-Rockwell Rotating, 500# Brass, Oil New 32" to 41" Dia. Shell Cupolas made to order.
1—Buckeye #150 crucible tilting furnace, with premix blower for gas fire.
1—Hausfeld 2000# aluminum capacity furnaces, barrel type, open flame, oil fired.
2—Monarch-Rockwell Rotating, 500# brass, oil.
1—Buckeye #150 Crucible tilting furnace, with Premix blower for gas fire.
New 32" to 41" Dia. shell Cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—Pangborn style GJ-1 rotoblast barrel, complete with Pangborn style FM automatic loader. Load capacity approximately 16 cu ft.
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete unit.
1—Pangborn LE 6 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuout sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.
1—Pangborn type EN-2 sand blast cabinet, suction type, 5 x 3 x 7 high.
MISCELLANEOUS
1—Gardner-Denver air compressor complete with 5 HP 3/60/220 motor and controls.
4—Heavy duty flexible shaft grinders 2 HP.
1—Heavy Duty Back Geared Sprue Cutter, 1½" square knives, T & L Pulley Drive.
1—Fay & Egan 14" blade revolving, double arbor, tilting table, variety saw with roller table.
1—Young Bros. Co. tower core oven, 5' x 1' shelves, gas fired, complete with Foxboro Control.
1—Young Bros. Co. batch type recirculating hot air gas fired core oven, 5' x 6' door opening, 9' deep.
3—Foundry Equipment Co., sliding shelf core ovens with five 30 x 42" shelves, 8" high. Gas Fired.
1—Lampson Endless Mold Conveyor 100' long x 16' wide, with 19 x 26" pallets, 36 inches on centers.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

1—Type P Class 1 Jeffery Sanditioner Serial No. 448, complete with motor used approximately 250 hours.
1—10' Roto-cast revolving mold conveyor complete.
1—Type GF Pangborn sand blast less motor.

BOX 655
The FOUNDRY CLEVELAND 13, OHIO

SURPLUS FOUNDRY EQUIPMENT FOR SALE

Milwaukee jolt pin lifter 46" x 48", jolt table 46" lift pin center 48", capacity 3500 pounds.
Jolt pattern draw molding machine 30" x 36", table Johnston & Jennings No. 2.
Tabor core machine rollover, pedestal, type air draw 8", boxes 14" x 24" x 12".

CONSOLIDATED ELECTRIC & AIR PUMP CO.
141 MANGIN STREET
NEW YORK 2, N. Y.

Classified Advertising

FOR SALE
FOUNDRY EQUIPMENT

BLOWERS

"American" #2V with 1 HP motor.
"Spencer Turbine" 32 oz. 1050 CFM with 15 HP mtr.
"Amer. Sirocco" #3½ with 5 HP mtr.
"Buffalo" #3½ duplex conoidal with 2 HP mtr.
"American" #5 with 5 HP mtr.
"American" #5 with 5 HP mtr.
"American" #5 with 5 HP mtr.
"American" #5 with 7½ HP mtr.
"Spencer Turbo" #316-B2-1 with 5 HP mtr. 24 oz. 150 CFM.
"American" #5V with 5 HP mtr.
"American" #4 with 3 HP mtrs.
Low pressure, 32 oz., 1600 CFM, "G.E." with a 20-24 HP motor, 3600/3/60/440.
"American" #6V with motor.

LAB. & TEST EQUIPMENT

Polishing mch., metallographic-floor mod. with ⅓ HP mtr.
Pyrometer, Hoskins type PA.
Scale, in grams "Ohaus".
Scale, "Jacobs Detectogram" mod. 7402.

MISCELLANEOUS

Tramrail system incl. 2 ton hoist.
(6) Tabor molding mchs, split pattern-jolt squeeze 13" x 18".
(2) Tabor molding mchs, special shockless jar squeezer 10" (called end bearing mach.)
(1) Osborn #42 Molding mch, portable.
(1) Arcade molding mch, portable—hand draw and jolt 16" x 12" plate.
Sand blast room "Sly" 10' x 10' complete with tank, blower and motors.
Vacuum Cleaner, portable "Spencer Turbine" with 3 HP Alligator shear "Hendley & Whittemore" #46 less motor.
Snag Grinder, "Standard" double end, 18" wheel.
Ingersoll Rand Air Compressor, 2 stage Imperial type 10B low pressure side 22" dia. x 16" stroke—high pressure side 13" dia. x 16" stroke, with 200 HP induction motor, slip ring type and controls.
Ingersoll Rand air compressor, 2 stage Imperial type XB, right hand size 16" x 14", left hand size 10" x 14", with 104 HP motor, starter, flat belt drive and air receiver tank 3½' dia. x 10' h.

FURNACES & OVENS

Furnace, elec. heat treat, "Electric Furnace Co." 14' L x 6' W x 6' hi., 250 KW-220V complete with controls.
Furnace, heat treat, "Industrial-Circ Air" gas fired car type, 14' L x 6'6" W x 6' hi., complete w/heater fan and 40 H.P. motor, elec. door hoist and L. & N. recorder.
Furnace, annealing-continuous, "Industrial Heating", 26' 6" x 6' W x 16" hi., gas fired, complete.
4 Furnaces, melting "Bellevue", 550# capacity.
10 Bohn Oil Fired Brass melting furnaces, pit type for No. 80 crucible.
(2) Furnaces, annealing electric G.E. bell type Mod #1954963 GR.
Atmosphere converter (gas cracker) gas fired G. E. Mod #6990139-G4 purchased for use with above furnaces.
Oven, normalizing gas fired Dewey 6' w x 7' d x 6' h outside dim.
Furnace, melting—pot type w/12 burners—taken from system for babbitting steel strip.
Furnace, melting gas fired muffle type Surface Combustion.
Furnace, heat treat salt bath Upton Elec.
Furnace, melting, rotary hearth, gas "Continental" approx. 18' dia.
Furnace, pre-heating rotary hearth, elec. "G.E." 175 KW 18' dia.
(1) Lindberg cyclone tempering furnace, type 6012042EH 180KW, 3/60/440 with (2) 3 hp motors, 2 zone control panel with model 5 "L&N" recorder-controller, Wheelco limitrol and Lindberg type A fuel insput controller.
(3) Bellevue melting furnaces, 550#—hand tilt.
(1) Oven type furnace "American Gas Furnace Co." #1, 7" x 12" x 29".
(27) Fisher melting furnaces, size B for #25 crucible.
(13) Hoskins electric furnaces, model FR 252.9 box type, 2000 deg. F. 26 KW.
(6) Monarch simplex melting furnaces, 500# cap., model #92, oil fired—hand rocking. 1 burner on each end of furnace, rammed with plastic brick and lined with 1" of SO 38 refractory.
(1) Maehler core oven, 2 compartment, approx. 15' 1 x 5' w x 6' h inside dim. each compt. Complete with core carriers, track, motors and blowers.
1—Monarch Simplex furnace, 1000 lb. cap. with blower & motor.

BOHN ALUMINUM & BRASS CORP.
1400 LAFAYETTE BLDG. DETROIT 26, MICH.

For Sale

FOR SALE

One Osborn No. 444 jolt rockover pattern draw molding machine—new condition.

WASHINGTON MACHINERY & SUPPLY CO.
W. 9 CATALDO AVE.
SPOKANE, WASHINGTON

FOR SALE

1—#5 Whiting cupola.
1—25 H.P. motor and Roots blower.

GRAY IRON FOUNDRY
1605 RIDGELY ST. BALTIMORE 30, MD.

FOR SALE

1—Used International tractor, complete with Hughes Keenan crane, 20" magnet and generator. Excellent condition.
1—No. 3 Simpson muller, complete, like new.
1—No. 3 Simpson muller, slightly used.

BOX 681
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

One—8' x 12' Ruemelin sand blast room complete with generator helmet, etc. ready to operate. Excellent condition.

BOX 661
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

(2) Herman 20" x 30" Hi-Speed #750 series pitless type jarr rollover and pattern drawing machines.
(1) 20" x 24" table plate, having 6" cylinder and jarring capacity of 1700# at 80# air pressure.

BOX 657
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Two Sly tumblers 36" x 36" x 59"

SOUTHERN DESK COMPANY
HICKORY, N. C.

FOUNDRY EQUIPMENT

1—Osborn Core Blower, No. 193.
1—Demmler Core Blower, Style 3-E.
1—Osborn Core Box Drawing Machine #146.
Molding Machines—Herman R.O. 1500 lb. cap.
Osborn Jolt Squeezers, various sizes.
1—#1 Simpson Mixer, motor drive.
1—#30 B. & P. Speedmullor.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314
FDY adv 967 5½pt CLEMENS 9-14——

FOR SALE
SAND HANDLING SYSTEM

19 individual moulders' hoppers, two 25 ton sand storage bins, one #50 Beardsley & Piper speed muller with 40 HP motor, magnetic separator with bucket elevator, overhead monorail system and cab controlled electric hoist and monotractor and shell buckets with automatic trips for delivering sand from speed muller to moulders' hoppers.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER MASSACHUSETTS

For Sale

FOR SALE

2—American Wheelabrator Tumblasts 36" x 42" Serial Numbers 48355 and 54532
1—American Wheelabrator Multi Tablast Model BM 66200 Serial Number A50689
1—Beardsley & Piper Speed Mullor Model 40
1—Whiting Cupola #6—Windbox only—never used
1—Whiting Cupola #6—50 foot stack. Dismantled and in excellent condition
1—Louden Overhead Monorail Pouring System 1000 feet of track and 19 bridges
1—Spencer Turbo Compressor with 40 HP motor
12—Overhead Pouring Devices
1—Simpson Mullor Model O
1—Beardsley & Piper Screenarator Model M
1—Root Blower Number 7
1—Champion Core Blower Model CB10
1—Osborn Core Blower Model 91
1—Lindberg Pit Type Tempering Furnace Type 2828-EH Serial Number 1337
12—Tabor Stationary Jar Top Squeezers
4—Osborn Squeezers 276-J
1—Osborn Squeezer 275-J
2—Tabor Jar Ram, Hand Rollover, Hand Draw Moulding Machines
Rollover, Hand Draw Moulding Machines
6—Tabor Hand Ram, Power Rollover, Hand Draw Moulding Machines
2—Tabor Portable Jar Flask Lift Moulding Machines—Table size 20" x 24"
1—Tabor Portable Shockless Jar Flask Lift Moulding Machine—Table size 32" x 32"
1—Osborn Pin Strip Machine Model 720U Table size 19" x 22"

OLD COLONY FOUNDRY CO.
EAST BRIDGEWATER, MASSACHUSETTS

FOR SALE

One screenator Model "L" Beardsley & Piper
Purchased—November 19, 1947
Serial Number—SL-2798-475
Motor—5 H.P. 600 R.P.M. 440 Volt 60 cycles 3 phase
Cutler Hammer starter
Pneumatic tires and 6 spare ½" opening screens.
Complete for ..... $750.00.

BOX 651
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—Tabor Handram Power Rollover Hydraulic Molding Machine 30" table serial No. 24818.
10—Tabor Power Rollover Molding Machines—22" table.
3—Osborn Rollover Hydraulic Box Draw Molding Machines—New 20" x 40" x 12" x 8" draw, model 147.
2—405 Osborn jolt rollover and pattern draw.
3—#94 Osborn Core Blowing Machines like new, with extra head each.
2—#91 Osborn Core Blowing Machines A-1 condition.
2—Tannewitz Metal Saws size G1E with 10 H.P. 220/440 V. Motor, like new.
1—Tabor cutoff saw with 10 H.P. Motor 220/440V.
1—Fisher Motorized Nose Pour Crucible Furnace Type AMM size 500 500# Aluminum. 1500# Brass complete with blower, gas or oil fired. A-1 condition.
2—Hausfeld Hand Tilting Furnaces combination gas or oil fired with blowers complete A-1 condition.
2—No. 1000 automatic Fisher tilting furnaces. Capacity 1000 lbs. aluminum.
1—#404 Clearfield Sand Mixer 4 cu ft. capacity, like new.
2—Despatch aluminum heat treat furnaces. 21 ft. x 13 ft. x 10 ft. Complete with controls.
2—67 ft. Despatch vertical core ovens.
1—47 ft. Despatch core oven.
1—Portable Sand Riddle.
Various sizes steel flasks.
Various sizes transite core plates.
Various sizes Popoff flasks and jackets.
Various sizes Snap flasks and steel bands.
Other various equipment for foundries.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.
15019 SARANAC RD. CLEVELAND 10, OHIO

Classified Advertising

For Sale

FOR SALE

1—#9 Whiting Cupola complete with Motor, Blower, and Blast Regulators.
1—#10 Whiting Cupola complete with Motor, Blower, and Blast Regulators.
1—#30 Beardsley and Piper Speedmuller with Loader.
1—27 x 36 Wheelabrator complete with Loader.
1—#1 Demmler Core Blower.
1—#2 Demmler Core Blower.
1—#3 Demmler Core Blower.
1—#193-S Osborn Core Blower.
1—American Sand Cutter.
1—Johnson & Jennings Rollover Machine 24 x 30 table.
Many other items too numerous to mention.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

3—REDFORD CARTRIDGE BENCH CORE BLOWERS, COMPLETE WITH REDFORD STEEL BENCHES. FIRST CLASS CONDITION. $250.00 EACH. ADDRESS: ENOT FOUNDRY COMPANY, WAYNE, MICHIGAN.

FOR SALE

1—Louisville Sand Cooler, 5 ton per hour capacity—New.
1—Link Belt Sand Drier and auxiliary equipment—Used.
1—Large Mahon Horizontal Core Oven with Link Belt Conveyor System—Used.
1—Model 500 P&H Crawler Crane Gasoline Driven with 40' boom and 10 K.W. Generator Set—Used.
Anyone interested in above equipment contact:

CENTRAL FOUNDRY DIVISION
GENERAL MOTORS CORPORATION
DANVILLE, ILLINOIS

For Sale

FOR SALE

Beardsley & Piper model 60 speedmullor, 5'8" bowl, with vertical type skip hoist for charging. Electrical for 220/440, 3 phase, 60 cycle. In good operating condition. Price low. Address: AMERICAN HOIST & DERRICK COMPANY, 63 SOUTH ROBERT STREET, ST. PAUL 1, MINNESOTA.

MEXITE

Overstocked and will sell at sacrifice.
THE MILLER FOUNDRY COMPANY

740 JENKINS AVENUE
COLUMBUS, OHIO

FOR SALE

Johnston & Jennings 815-B rollover pattern draw machine. Johnston & Jennings 682 jolt stripper. Used one year. Excellent condition, reasonably priced. Address: Box 648, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Two electric Detroit rocking furnaces, 500 lb. capacity, including all switch boxes, conduits and transformers. Used three months—like new. Address: MAGNA, INC., 129 E. San Fernando, San Jose, California.

FOR SALE

Patent for drinking fountain for cattle, suitable for manufacture by a gray iron or aluminum foundry. Address: H. C. MUNSON, MASSENA, NEW YORK.

For Sale

FOR SALE

1—Unit drive #2 Simpson mixer with 1000-lb. mullers, single discharge, air operated, plain wear plate, equipped as follows: 20 HP 60 cycle, 3 phase 220 volt AC motor. This mixer is in excellent condition and has the following equipment:

1. No. 2 straight lift bucket loader with motor and starter.
2. No. 2 National aerator.
3. Screening and magnetic separator unit.

BOX 665
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—Chicago pneumatic 1 ton overhead air hoist—like new. Still in crate. Cost $436.00. Will sell for $295.000—15 ft. lift—42 ft. per minute lifting speed. Serial 616152 Model B.
1—Ingersoll-Rand hoist, 1 ton, used about one month. Cost $480.000. Selling price $275.00. Serial A-49651.

W. N. RUSSELL & CO.
34 ALBERTSON AVENUE, WESTMONT 7, N.J

FOR SALE

Used iron foundry equipment consisting of cupola 5 ton capacity, blast blower with motor and air compressor as well as miscellaneous items. May be seen at: RESINA AUTOMATIC MACHINERY CO., INC., 572 SMITH STREET, BROOKLYN, NEW YORK.

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 12.00	$11.00	$10.00	$ 9.00
2 inches	21.75	20.00	18.25	16.75
3 inches	32.00	29.25	26.75	24.00
4 inches	40.00	36.75	33.25	30.00
5 inches, ½ col.	48.00	44.00	40.00	36.00
6 inches	58.75	53.25	48.00	42.75
7 inches	66.00	60.00	54.00	48.00
8 inches	73.25	66.75	60.00	53.25
10 inches, 1 col..	88.00	80.00	72.00	64.00
Half Page	130.00	120.00	110.00	100.00
Full Page	220.00	200.00	180.00	160.00

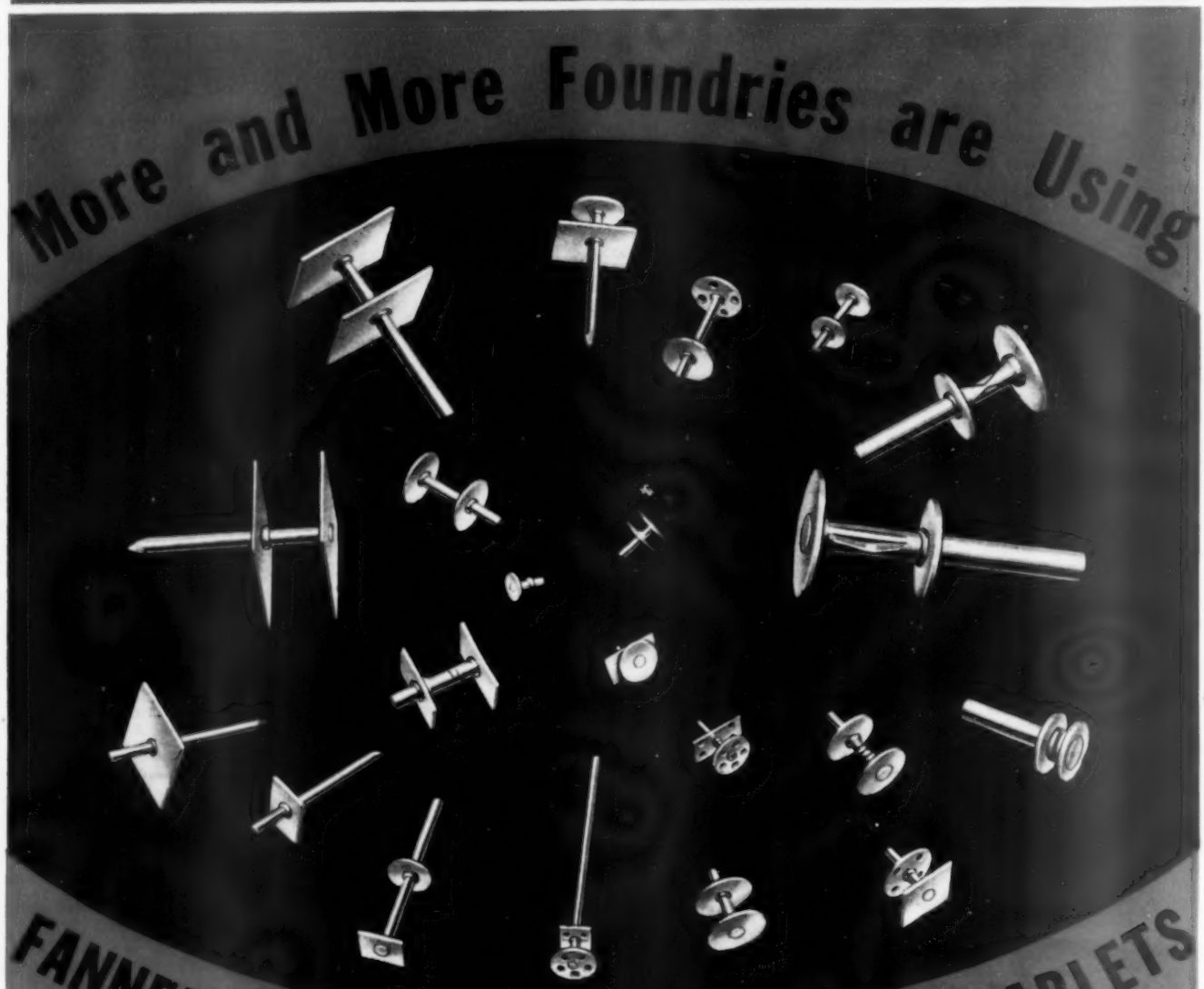
Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

THE FOUNDRY

Penton Building, Cleveland 13, Ohio

IT'S FANNER for CHAPLETS

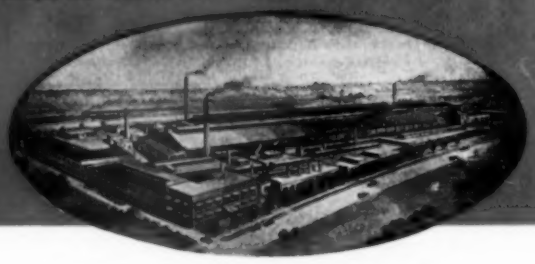
More and More Foundries are Using



FANNER DOUBLE HEAD ANCHOR CHAPLETS

Important Notice:

Two motion picture films—one on the use of Chaplets, the other on the use of Chills—are available, free of charge, for showing at Foremen Club meetings, in technical schools, A. F. A. chapter meetings, etc. Write for reservation.



Birdseye view of the Fanner Brookside Park plant in Cleveland

These specially Fanner designed chaplets are rapidly replacing other types of chaplets in foundries the country over . . . BECAUSE THEY ARE EXTRA ADDED INSURANCE OF PRECISION CASTING.

The reason is the extended stem which serves as a definite anchor in holding the chaplet in place, keeps it from being washed away in the molten metal.

If you're using any kind of chaplets, by all means investigate these Fanner Chaplets without delay.

THE FANNER MFG. CO.
CLEVELAND 1, OHIO

In Canada: CANADIAN FANNER LTD., Hamilton, Ont., Canada

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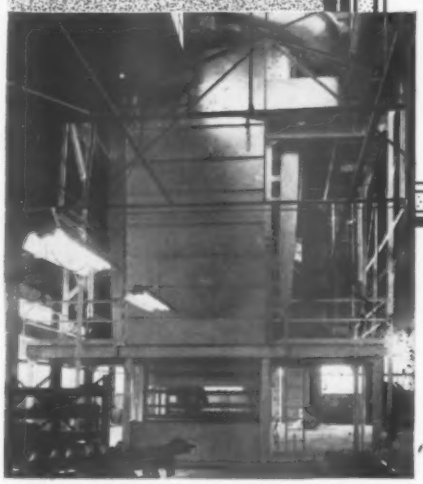

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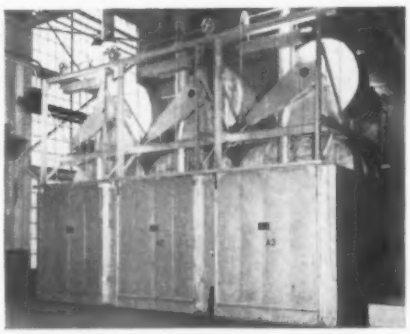

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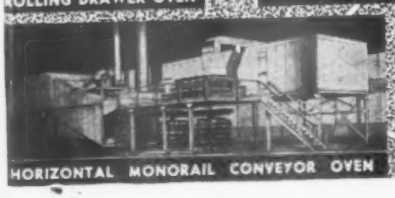

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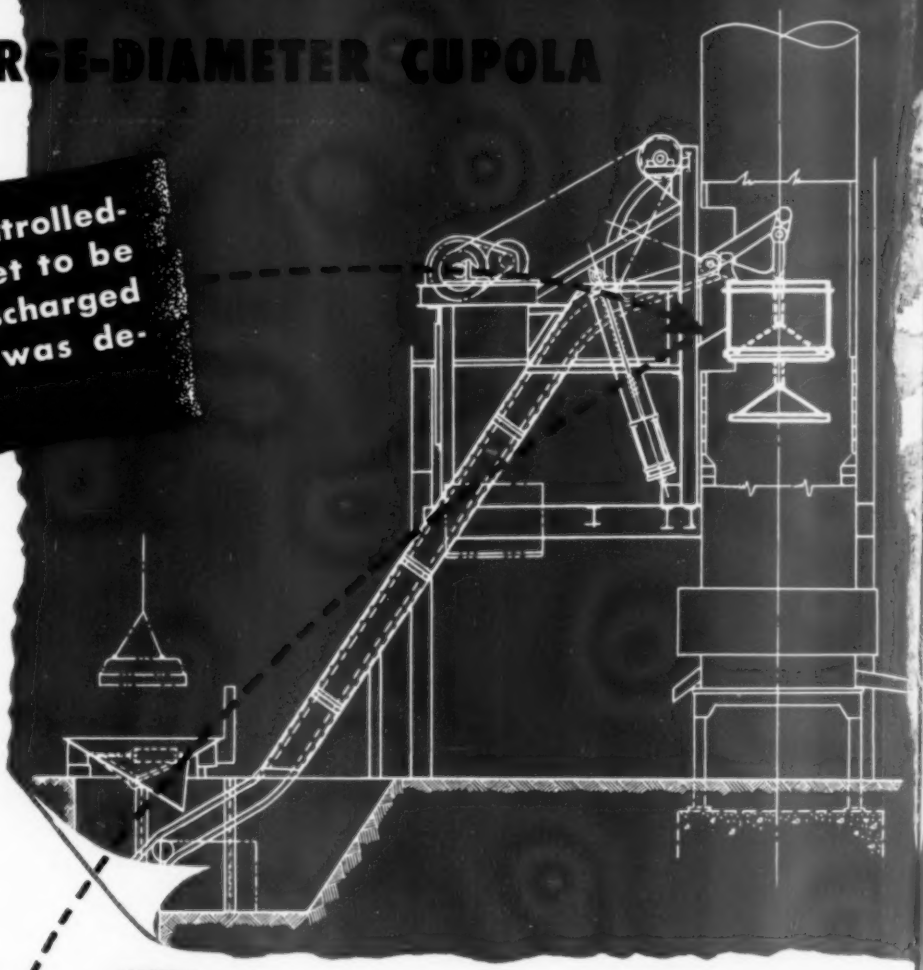
The FIRST Full-Cone Type, Controlled-Discharge Charging Bucket to be mounted in a Skip, and discharged without cupola support, was developed by MODERN.*



These early Full-Cone Type Buckets, of which there are many installations, are still giving satisfactory service in daily operation. In the meantime, MODERN* has continued to develop the Cone Type Charging Bucket for large-diameter cupolas to its present high level of efficiency . . .

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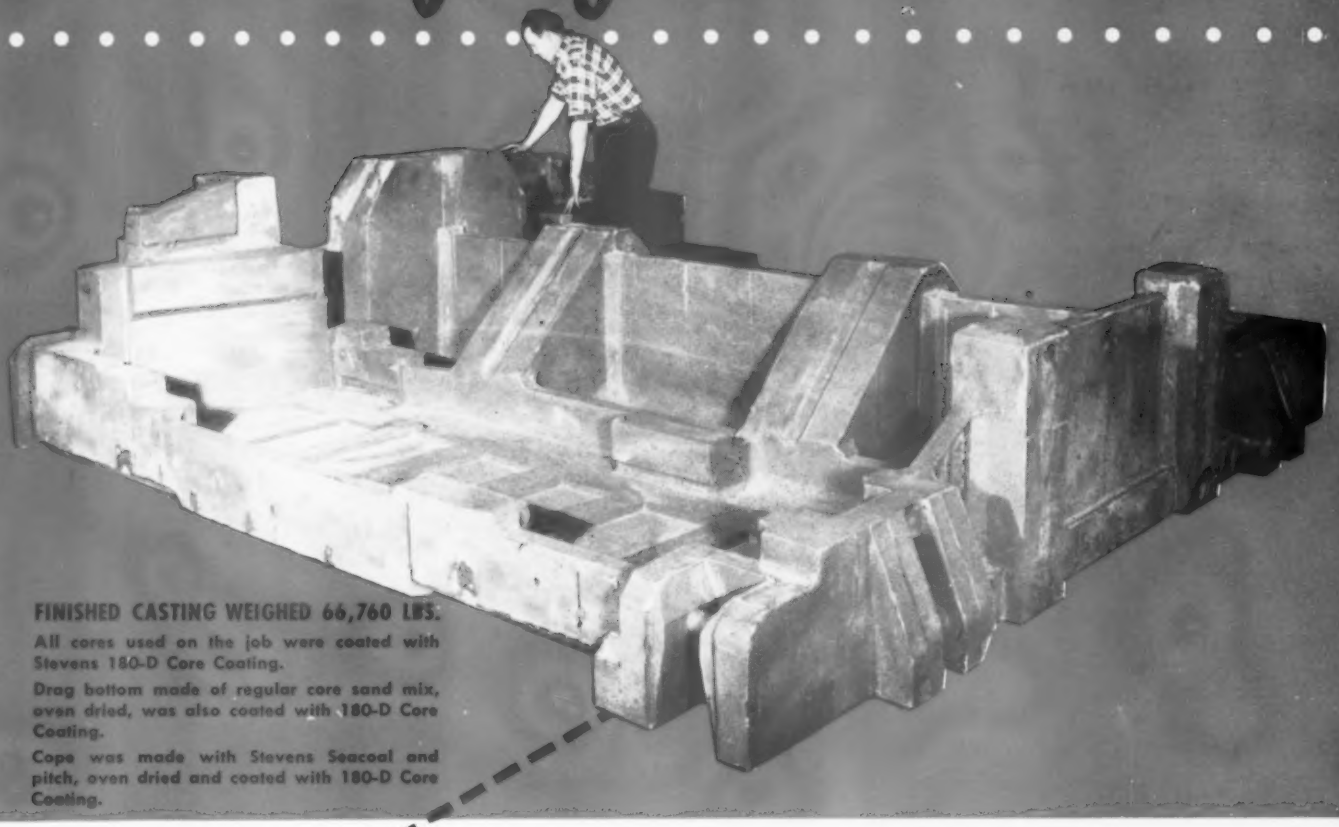
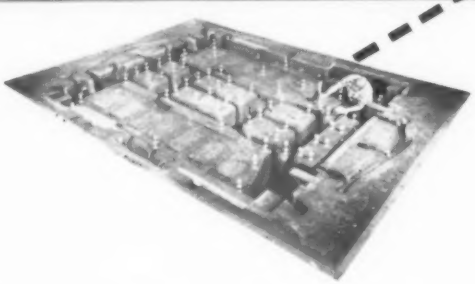


FINISHED CASTING WEIGHED 66,760 LBS.

All cores used on the job were coated with Stevens 180-D Core Coating.

Drag bottom made of regular core sand mix, oven dried, was also coated with 180-D Core Coating.

Cope was made with Stevens Seacoal and pitch, oven dried and coated with 180-D Core Coating.



The Stevens "Job-Qualified" Foundry Facings used in producing this 33 ton Casting had to be just right!

The old saying, "never send a boy to do a man's work," was never more true than in the application of core and mold coatings to "special" casting jobs such as are regularly turned out by Central Iron Foundry Co. of Detroit.

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